



## **Biological Assessment and Stressor Study Report**

### **Peruque Creek St. Charles and Warren Counties, Missouri**

**July 2014 – March 2015**

Prepared for:

Missouri Department of Natural Resources  
Division of Environmental Quality  
Water Protection Program  
Water Pollution Control Branch

Prepared by:

Missouri Department of Natural Resources  
Division of Environmental Quality  
Environmental Services Program  
Water Quality Monitoring Section

## Table of Contents

|                                                                                                     | <b>Page</b> |
|-----------------------------------------------------------------------------------------------------|-------------|
| 1.0 Introduction.....                                                                               | 1           |
| 1.1 Purpose.....                                                                                    | 1           |
| 1.2 Objectives .....                                                                                | 1           |
| 1.3 Tasks .....                                                                                     | 1           |
| 1.4 Null Hypotheses.....                                                                            | 2           |
| 2.0 Study Area .....                                                                                | 2           |
| 2.1 Peruque Creek Site Descriptions .....                                                           | 2           |
| 3.0 Methods.....                                                                                    | 4           |
| 3.1 Land Use .....                                                                                  | 4           |
| 3.2 Habitat Assessment.....                                                                         | 4           |
| 3.3 Physicochemical Data Collection and Analysis .....                                              | 5           |
| 3.4 Long-term Dissolved Oxygen, Temperature, and Specific Conductivity<br>Measurements .....        | 5           |
| 3.5 Macroinvertebrate Collection and Analysis.....                                                  | 5           |
| 4.0 Quality Assurance/Quality Control.....                                                          | 6           |
| 4.1 Field Meters .....                                                                              | 6           |
| 4.2 Biological Samples .....                                                                        | 6           |
| 4.3 Biological Data Entry .....                                                                     | 6           |
| 4.4 Duplicate Sample Collection .....                                                               | 6           |
| 5.0 Data Results and Analyses.....                                                                  | 7           |
| 5.1 Land Use .....                                                                                  | 7           |
| 5.2 Habitat Assessment.....                                                                         | 7           |
| 5.3 Physicochemical Data.....                                                                       | 7           |
| 5.4 Long-term Dissolved Oxygen, Temperature, and Specific<br>Conductivity.....                      | 9           |
| 5.5 Biological Assessment.....                                                                      | 13          |
| 5.5.1 Semi-quantitative Macroinvertebrate Stream Bioassessment<br>Project Procedure (SMSBPP) .....  | 13          |
| 5.5.2 Comparisons with Biocriteria Reference Streams in the Central<br>Plains/Cuivre/Salt EDU ..... | 13          |
| 5.5.3 Peruque Creek Longitudinal Comparisons .....                                                  | 14          |
| 5.5.4 Peruque Creek Seasonal Comparisons.....                                                       | 15          |
| 5.5.5 Macroinvertebrate Percent and Community Composition .....                                     | 15          |
| 6.0 Discussion.....                                                                                 | 16          |
| 6.1 Habitat/Land Use .....                                                                          | 16          |
| 6.2 Physicochemical Data.....                                                                       | 17          |
| 6.3 Long-term Dissolved Oxygen, Temperature, and Specific<br>Conductivity.....                      | 17          |
| 6.4 Biological Assessment.....                                                                      | 17          |
| 6.5 Comparison with 2002 Study.....                                                                 | 18          |
| 7.0 Null Hypotheses Summary .....                                                                   | 18          |
| 8.0 Literature Cited .....                                                                          | 18          |

## Tables

|          |                                                                                                                                                                                | <b>Page</b> |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Table 1  | Percent Land Cover.....                                                                                                                                                        | 2           |
| Table 2  | Peruque Creek Physical Characteristics.....                                                                                                                                    | 4           |
| Table 3  | Habitat Scores (Fall 2014) .....                                                                                                                                               | 7           |
| Table 4  | <i>In Situ</i> Water Quality Measurements and Turbidity at<br>All Stations (Fall 2014).....                                                                                    | 8           |
| Table 5  | <i>In Situ</i> Water Quality Measurements and Turbidity at<br>All Stations (Spring 2015) .....                                                                                 | 8           |
| Table 6  | Water Chemistry Concentrations at All Stations (Fall 2014) .....                                                                                                               | 8           |
| Table 7  | Water Chemistry Concentrations at All Stations (Spring 2015).....                                                                                                              | 9           |
| Table 8  | Biological Criteria for Warm Water Reference Streams in the Central<br>Plains/Cuivre/Salt EDU (Spring Season).....                                                             | 13          |
| Table 9  | Biological Criteria for Warm Water Reference Streams in the Central<br>Plains/Cuivre/Salt EDU (Fall Season) .....                                                              | 13          |
| Table 10 | Peruque Creek Metric Values (and Scores), MSCI Scores, and<br>Supportability Rankings for Peruque Creek Fall 2014 (With Fall<br>2002 Scores and Rankings for Comparison) ..... | 14          |
| Table 11 | Peruque Creek Metric Values (and Scores), MSCI Scores, and<br>Supportability Rankings, Spring 2015 (With Spring<br>2002 Scores and Rankings for Comparison) .....              | 14          |
| Table 12 | Peruque Creek Dominant Macroinvertebrate Composition.....                                                                                                                      | 16          |

## Figures

|          |                                                                           |    |
|----------|---------------------------------------------------------------------------|----|
| Figure 1 | Station #1 Long-Term Dissolved Oxygen (mg/L).....                         | 10 |
| Figure 2 | Station #3 Long-Term Dissolved Oxygen (mg/L) .....                        | 10 |
| Figure 3 | Station #1 Long-Term Dissolved Oxygen (mg/L)<br>and Temperature (°C)..... | 11 |
| Figure 4 | Station #3 Long-Term Dissolved Oxygen (mg/L)<br>and Temperature (°C)..... | 11 |
| Figure 5 | Station #1 Long-Term Specific Conductivity (µS/cm).....                   | 12 |
| Figure 6 | Station #3 Long-Term Specific Conductivity (µS/cm).....                   | 12 |

## Attachments

|            |                                                                                 |
|------------|---------------------------------------------------------------------------------|
| Appendix A | Peruque Creek Study Area Map                                                    |
| Appendix B | Dissolved Oxygen, Temperature, and Specific Conductivity Data Logger<br>Results |
| Appendix C | Macroinvertebrate Bench Sheets                                                  |
| Appendix D | Addendum: Benthic Sediment Deposition Estimation Study                          |

## **1.0 Introduction**

At the request of the Missouri Department of Natural Resources' (MDNR) Water Protection Program (WPP), the Environmental Services Program's (ESP) Water Quality Monitoring Section (WQMS) conducted a biological assessment and stressor study of upper Peruque Creek, upstream of Lake St. Louis. The assessed reach of Peruque Creek flows through rural and suburbanized watershed in St. Charles and Warren counties. A previous biological assessment and water quality study was conducted by WQMS in 2002 (MDNR 2003).

According to the Missouri Water Quality Standards (WQS), 10 CSR 20-7.031 (MDNR 2014c), a 4.0-mile segment of Peruque Creek is designated class "P" that begins at its entrance to Lake St. Louis in St. Charles County and goes upstream to sec. 25, T. 47 N., R. 01 E. A 10.9-mile Class "C" segment of Peruque Creek goes from the upper end of its Class "P" segment to sec. 23, T. 47 N., R. 01 W. Going upstream in the Class "C" segment, the stream crosses from St. Charles County into Warren County. Beneficial use designations are livestock and wildlife watering, protection of warm water aquatic life, human health—fish consumption, and whole body contact recreation B, and secondary contact recreation. According to the most recent Water Quality Standards (MDNR 2014c), the upper reach of Peruque Creek that was not previously classified is now included within the "Missouri Use Designation Dataset Version 1.0" category as of August 20, 2013.

In the 2014 303(d) list of impaired waters, this 4.0-mile class "P" section and the 10.9-mile Class "C" section of Peruque Creek are listed as impaired for "fish bioassessments" by nonpoint sources. Streams listed as impaired for "fish bioassessment" are due to data that show less diversity than fish communities in similar sized streams (MDNR 2015).

### **1.1 Purpose**

The purpose of this study was to determine if the Peruque Creek macroinvertebrate community and/or stream habitat were impaired and, if so, determine the possible causes.

### **1.2 Objectives**

- Determine if the macroinvertebrate community of Peruque Creek is biologically impaired.
- Determine the habitat characteristics of Peruque Creek.
- Define the water quality characteristics of Peruque Creek.

### **1.3 Tasks**

- Conduct a biological assessment of the macroinvertebrate community of Peruque Creek.
- Conduct a habitat assessment of Peruque Creek.
- Conduct a water quality assessment and stressor study of Peruque Creek.

## 1.4 Null Hypotheses

- Macroinvertebrate assemblages are similar between Peruque Creek and biocriteria reference (**BIOREF**) streams in the same Ecological Drainage Unit (**EDU**).
- Macroinvertebrate assemblages are similar among Peruque Creek stream segments.
- Macroinvertebrate assemblages will not differ between the two sample seasons.
- Habitat quality is similar among Peruque Creek stream segments.
- Habitat quality is similar between Peruque Creek and biocriteria reference streams.

## 2.0 Study Area

Peruque Creek originates near the town of Wright City in Warren County. It flows predominantly east to St. Charles County into Lake St. Louis. From Lake St. Louis it flows predominantly northeast until its confluence with the Mississippi River. This study only included the portion upstream of Lake St. Louis.

Peruque Creek is located within the Central Plains/Cuivre/Salt EDU. An EDU is a region where biological communities and habitat conditions can be expected to be similar. See Appendix A for a map of EDUs and the sampling reaches for Peruque Creek. See Table 1 for a comparison of land use for the EDU and the 12-digit Hydrologic Units (**HU**).

**Table 1**  
**Percent Land Cover**

|                                | 12-digit HUC | Impervious | Urban          |               | Barren/<br>Sparsely Vegetated | Cropland | Grassland | Forest (Total) | Herbaceous (Total)<br>Woody/ | Wetland (Total) | Open Water |
|--------------------------------|--------------|------------|----------------|---------------|-------------------------------|----------|-----------|----------------|------------------------------|-----------------|------------|
|                                |              |            | High Intensity | Low Intensity |                               |          |           |                |                              |                 |            |
| Central Plains/Cuivre/Salt EDU |              | 1.7        | 0.1            | 1.6           | 0.1                           | 42.6     | 29.2      | 17.0           | 2.1                          | 3.3             | 2.2        |
| Peruque Cr. Stations           | 071100090101 | 4.5        | 0.1            | 10.7          | 1.2                           | 28.7     | 24.1      | 23.2           | 2.5                          | 1.5             | 3.6        |

## 2.1 Peruque Creek Site Descriptions

Six sampling locations were selected for this study. Sample stations were located in St. Charles and Warren counties (see map, Appendix A). The average width and discharge measurements in cubic feet per second (**cfs**) during both survey periods are given for each Peruque Creek sampling station in Table 2. The approximate drainage areas for the sites in square miles (**mi**<sup>2</sup>) are presented in Table 2 as well. Drainage area was calculated using the Geographic Information System (**GIS**) software program ArcMap.

All stations are in the Class “C” portion of the stream except Station #1, which is Class “P,” and Station # 6, which is in the previously unclassified but now the “Missouri Use Designation Dataset Version 1.0” category.

Peruque Creek Station #1 (SW ¼ sec. 32, T. 47 N., R. 02 E.) is located downstream of the Duello Road crossing in St. Charles County. Geographic coordinates at the upstream terminus of this station are UTM Grid 15, East 688843, and North 4295369.

Peruque Creek Station #2 (NE ¼ NE ¼ sec. 35, T. 47 N., R. 01 E.) is located upstream of the Wilmer Road crossing in St. Charles County. This station has a predominantly bedrock substrate with little available coarse substrate. Geographic coordinates at the upstream terminus of this station are UTM Grid 15, East 684275, and North 4296135.

Peruque Creek Station #3 (Sur 149, T. 47 N., R. 01 E.) is located upstream of the Hepperman Road crossing in St. Charles County. Geographic coordinates at the downstream terminus of this station are UTM Grid 15, East 683584, and North 4295884.

Peruque Creek Station #4 (W ½ sec. 30, T. 47 N., R. 01 E.) is located upstream of the Highway T crossing in St. Charles County. This station is a stream distance of approximately 5500 meters (3.4 mi) downstream of the Wright City Waste Water Treatment Facility (WWTF) (Permit No. MO-0023191). Geographic coordinates at the downstream terminus of this station are UTM Grid 15, East 677598, and North 4297082.

Peruque Creek Station #5 (SW ¼ SW ¼ sec. 23, T. 47 N., R. 01 W.) is located upstream of Stringtown Road in Warren County. This station has a predominantly bedrock substrate. It is the first station downstream of the Wright City WWTF at a stream distance of approximately 1200 meters (0.75 mi) from the outfall. Geographic coordinates at the upstream terminus of this station are UTM Grid 15, East 673862, and North 4298203.

Peruque Creek Station #6 (NW ¼ sec. 22, T. 47 N., R. 01 W.) is located at Ruge Memorial Park in Wright City. Geographic coordinates at the upstream terminus of this station are UTM Grid 15, East 672203, and North 4298848.

During reconnaissance for this study in late July of 2014, the upstream three sites were reduced to isolated pools. The streambed of Station #6 was especially dry, with very little water limited to small pools.

Table 2  
 Peruque Creek Physical Characteristics

| Station # | Mean Width (ft.) | Approx. Drainage Area (mi <sup>2</sup> ) | Spring 2014 Discharge (cfs) | Fall 2015 Discharge (cfs) |
|-----------|------------------|------------------------------------------|-----------------------------|---------------------------|
| 1         | 68               | 38                                       | 2.6                         | 20.6                      |
| 2         | 54               | 31                                       | 1.5                         | 15.8                      |
| 3         | 60               | 28                                       | 1.3/1.4*                    | 17.2/17.0*                |
| 4         | 48               | 15                                       | 0.4                         | 6.4                       |
| 5         | 30               | 7                                        | 0.3                         | 3.2                       |
| 6         | 28               | 4                                        | <0.1                        | 0.8                       |

\*Duplicate discharge measurements

### 3.0 Methods

Sampling at Peruque Creek was conducted in the fall on September 23 and 24, 2014 and in the spring on March 30 and 31, 2015. Sampling was conducted by Brian Nodine, Brandy Bergthold, and Ken Lister of ESP. Sampling consisted of water sampling and macroinvertebrate collection. Habitat assessments were conducted during the fall sampling season on Peruque Creek as well as a BIOREF station on South River in Marion County.

For the stressor portion of the study, data loggers were deployed at Stations #1 and #3 to record dissolved oxygen (**DO**), temperature, and specific conductivity. Loggers were placed in Peruque Creek on July 29 and retrieved on August 8, 2014.

Estimation of benthic fine sediment coverage was planned to be part of the stressor portion of this study. However, base flow conditions with steady flow are required at all stations to conduct benthic sediment assessments (MDNR 2014b). Persistent high water conditions during most of the study period, as well as pooled conditions during reconnaissance and data logger deployment early in the study, precluded this procedure. Sediment deposition estimation will be conducted during favorable field conditions in the future and the results will be presented as an addendum to this report (see Appendix D, addendum attached November 1, 2016).

### 3.1 Land Use

Land cover data were derived from the Thematic Mapper satellite data from 2001-2004 and interpreted by the Missouri Resource Assessment Partnership (**MoRAP**). See Section 2.0 and Table 1 for land use information.

### 3.2 Habitat Assessment

A standardized habitat procedure for riffle/pool stream types was followed as described in the *Stream Habitat Assessment Project Procedure (SHAPP)* (MDNR 2010c). Peruque Creek habitat scores were compared with the habitat score from a BIOREF station on the South River conducted during the same season.

### 3.3 Physicochemical Data Collection and Analysis

During each survey period, *in situ* water quality measurements were collected at all stations for temperature (°C), dissolved oxygen concentration (mg/L), conductivity (µS/cm), and pH (standard units). These measurements followed Standard Operating Procedures MDNR-ESP-101 *Field Measurement of Water Temperature* (MDNR 2010b), MDNR-ESP-103 *Sample Collection and Field Analysis for Dissolved Oxygen Using a YSI Membrane Electrode Meter, Hach HQ40d LDO Probe or YSI Pro ODO Probe* (MDNR 2012b), MDNR-ESP-102 *Field Analysis for Specific Conductance* (MDNR 2010a), and MDNR-ESP-100 *Field Analysis of Water Samples for pH* (MDNR 2012a), respectively. Additionally, water samples were analyzed by ESP's Chemical Analysis Section (CAS) for chloride, sulfate, total phosphorus (TP), ammonia-N (NH<sub>3</sub>-N), nitrate + nitrite-N (NO<sub>3</sub> + NO<sub>2</sub>-N), total nitrogen (TN), non-filterable residue (NFR), magnesium (Mg), calcium (Ca), and hardness. Turbidity in Nephelometric Turbidity Units (NTU) was analyzed by the WQMS.

Stream discharge in cubic feet per second (cfs) was measured at each sampling station using a Marsh-McBirney Flo-Mate Model 2000. Discharge was calculated and reported per the methods in the Standard Operating Procedure MDNR-ESP-113 *Flow Measurements in Open Channels* (MDNR 2013).

Physicochemical data were summarized and presented in tabular form for comparison among Peruque Creek stations and between sample seasons.

### 3.4 Long-term Dissolved Oxygen, Temperature, and Specific Conductivity Measurements

A YSI Model 6920 V2 data logger [YSI Incorporated, Yellow Springs, Ohio 45387 (a subsidiary of Xylem Incorporated)] was deployed for a 10-day period during anticipated summertime low-flow periods to measure DO, temperature, and specific conductivity every 15 minutes. Data logger use was conducted following Standard Operating Procedure MDNR-ESP-104 *Continuous or Long-Term Monitoring of Water Quality Using a Dissolved Oxygen, Specific Conductivity, pH, Turbidity, Rhodamine Dye, and Temperature Data Logger* (MDNR 2014a).

### 3.5 Macroinvertebrate Collection and Analysis

Standardized sample collection procedures and analysis were followed as described in the *Semi-quantitative Macroinvertebrate Stream Bioassessment Project Procedure* (SMSBPP) (MDNR 2012c). Three standard habitats, coarse substrate (CS), non-flowing water with depositional substrate (NF), and rootmat (RM) at the stream edge, were sampled at all locations.

A standardized sample analysis procedure was followed as described in the SMSBPP. The SMSBPP provides details on the calculation of metrics and scoring of the multi-metric Macroinvertebrate Stream Condition Index (MSCI). The following four metrics were used: 1) Taxa Richness (TR); 2) total number of taxa in the orders Ephemeroptera,



Plecoptera, and Trichoptera (**EPTT**); 3) Biotic Index (**BI**); and 4) Shannon Diversity Index (**SDI**).

Macroinvertebrate data were analyzed in three specific ways. First, Peruque Creek stations were compared to biological criteria for the Central Plains/Cuivre/Salt EDU. This first comparison provides an MSCI score that is used to determine whether the stream supports the protection of warm water aquatic life beneficial use designation as stated in the Water Quality Standards (MNDR 2014c). Second, a longitudinal comparison among Peruque Creek sites was performed. Finally, a comparison was made of Peruque Creek data between fall and spring sampling seasons. See Tables 8 and 9 for biological criteria for warm water reference streams in the Central Plains/Cuivre/Salt EDU for the fall and spring.

#### **4.0 Quality Assurance/Quality Control**

Quality Assurance/Quality Control (**QA/QC**) procedures were followed as described in pertinent Standard Operating and Project Procedures.

##### **4.1 Field Meters**

All field meters used to collect water quality parameters were maintained in accordance with the Standard Operating Procedure MDNR-ESP-213, *Quality Control Procedures for Checking Water Quality Field Instruments* (MDNR 2010d).

##### **4.2 Biological Samples**

Steps to assure accuracy of organism removal from sample debris were performed consistent with those methods found in the SMSBPP document (MDNR 2012c).

##### **4.3 Biological Data Entry**

All macroinvertebrate data were entered into the WQMS macroinvertebrate database consistent with the Standard Operating Procedure MDNR-ESP-214, *Quality Control Procedures for Data Processing* (MDNR 2014d).

##### **4.4 Duplicate Sample Collection**

Duplicate water samples were collected and analyzed for physicochemical parameters at Peruque Creek Station 3 during both sampling seasons. Duplicate macroinvertebrate samples also are collected during each sample season from three randomly selected stations from all current biological study sites. No Peruque Creek stations were chosen as duplicates.

## 5.0 Data Results and Analyses

### 5.1 Land Use

According to MoRAP land cover files (see Table 1) the watershed land use of Peruque Creek is made up mostly of forest, grassland, and cropland with 10.7 % listed as “Low Intensity Urban.” The Peruque Creek watershed has continued to undergo conspicuous urban development, and available MoRAP land cover data from 2001-2004 (see Section 3.1) likely under-represent the percentage of current urban land cover.

### 5.2 Habitat Assessment

Habitat assessment scores were recorded for each sampling station, and results are presented in Table 3. According to project procedure guidance, the total score from the physical habitat assessment of the study sites should be at least 75 percent of the total score of the habitat assessment of a BIOREF station to support a similar biological community. Habitat scores for the Peruque Creek stations were compared with a South River BIOREF station habitat assessment conducted during the same season. All Peruque Creek stations exceeded the 75 percent threshold, so it is therefore inferred that based on habitat scores, they should support comparable biological communities.

Table 3  
 Habitat Scores (Fall 2014)

| <b>BIOREF</b> | <b>Habitat Score</b> | <b>Peruque Creek Station #</b> | <b>Habitat Score</b> | <b>% of South R. BIOREF</b> |
|---------------|----------------------|--------------------------------|----------------------|-----------------------------|
| South River   | 118                  | 1                              | 124                  | 105                         |
|               |                      | 2                              | 120                  | 102                         |
|               |                      | 3                              | 126                  | 107                         |
|               |                      | 4                              | 128                  | 108                         |
|               |                      | 5                              | 113                  | 96                          |
|               |                      | 6                              | 108                  | 92                          |

### 5.3 Physicochemical Data

*In situ* water quality measurements and turbidity are summarized in Table 4 (fall 2014) and Table 5 (spring 2015). Mean temperatures at Peruque Creek stations were 17.0°C and 13.5°C in the fall and spring surveys, respectively.

*In situ* dissolved oxygen levels were above the Water Quality Standards minimum concentration for warm-water and cool-water fisheries (5.0 mg/L). Typically, dissolved oxygen levels are higher during the spring season when water temperatures are cooler. See Section 5.5 for further DO information.

Table 4  
*In situ* Water Quality Measurements and Turbidity at All Stations (Fall 2014)

| Station | Parameter  |                                    |                        |     |                    |
|---------|------------|------------------------------------|------------------------|-----|--------------------|
|         | Temp. (°C) | Dissolved O <sub>2</sub><br>(mg/L) | Spec. Cond.<br>(µS/cm) | pH  | Turbidity<br>(NTU) |
| 1       | 17.0       | 9.10                               | 572                    | 8.0 | 0.71               |
| 2       | 20.0       | 9.60                               | 541                    | 8.2 | 1.06               |
| 3a      | 16.0       | 7.51                               | 547                    | 7.9 | 1.63               |
| 3b      | 16.0       | 7.41                               | 546                    | 7.8 | 1.11               |
| 4       | 16.0       | 10.92                              | 610                    | 8.1 | 0.71               |
| 5       | 18.0       | 11.12                              | 847                    | 8.4 | 2.21               |
| 6       | 15.0       | 7.50                               | 624                    | 7.9 | 1.54               |

Table 5  
*In situ* Water Quality Measurements and Turbidity at All Stations (Spring 2015)

| Station | Parameter  |                                    |                        |     |                    |
|---------|------------|------------------------------------|------------------------|-----|--------------------|
|         | Temp. (°C) | Dissolved O <sub>2</sub><br>(mg/L) | Spec. Cond.<br>(µS/cm) | pH  | Turbidity<br>(NTU) |
| 1       | 10.0       | 9.97                               | 493                    | 7.6 | 6.00               |
| 2       | 10.0       | 10.64                              | 441                    | 8.1 | 4.74               |
| 3a      | 13.0       | 12.62                              | 439                    | 8.0 | 5.53               |
| 3b      | 13.0       | 12.73                              | 440                    | 8.0 | 6.47               |
| 4       | 14.0       | 12.65                              | 470                    | 8.4 | 4.23               |
| 5       | 15.0       | 16.42                              | 541                    | 8.9 | 7.87               |
| 6       | 13.0       | 13.47                              | 436                    | 8.2 | 9.85               |

Water chemistry results including nutrients, chloride, and sulfate for the fall and spring sample seasons are presented in Tables 6 and 7, respectively. All chloride and sulfate levels were below acute and chronic criteria for protection of aquatic life and drinking water supply. During the spring sample season Station #5 exceeded the WQS criteria for NH<sub>3</sub>-N at the measured *in situ* pH for cool and warm water fisheries.

Table 6  
 Water Chemistry Concentrations at All Stations (Fall 2014)

| Station | Sample # | Parameter (mg/L)   |                                         |      |       |          |      |      |          |         |     |
|---------|----------|--------------------|-----------------------------------------|------|-------|----------|------|------|----------|---------|-----|
|         |          | NH <sub>3</sub> -N | NO <sub>3</sub> +<br>NO <sub>2</sub> -N | TN   | TP    | Hardness | Ca   | Mg   | Chloride | Sulfate | NFR |
| 1       | 1411914  | <0.03              | 0.067                                   | 0.28 | 0.036 | 254      | 75.8 | 15.7 | 41.0     | 30.5    | <5  |
| 2       | 1411915  | <0.03              | 0.012                                   | 0.21 | 0.037 | 237      | 72.3 | 13.6 | 33.7     | 31.3    | <5  |
| 3a      | 1411916  | <0.03              | 0.028                                   | 0.20 | 0.040 | 235      | 71.8 | 13.6 | 33.4     | 31.5    | <5  |
| 3b      | 1411917  | <0.03              | 0.029                                   | 0.28 | 0.040 | 252      | 77.1 | 14.4 | 32.7     | 31.7    | <5  |
| 4       | 1411918  | <0.03              | 0.10                                    | 0.31 | 0.16  | 248      | 72.2 | 16.5 | 50.3     | 38.6    | <5  |
| 5       | 1411920  | 0.070              | 3.66                                    | 3.84 | 1.98  | 263      | 73.2 | 19.6 | 105      | 61.2    | <5  |
| 6       | 1411919  | 0.066              | 0.048                                   | 0.43 | 0.047 | 273      | 83.0 | 15.9 | 33.6     | 86.7    | <5  |

All "less than" values are below detectable limits.

**Table 7**  
**Water Chemistry Concentrations at All Stations (Spring 2015)**

| Station | Sample # | Parameter (mg/L)   |                                         |      |       |          |      |      |          |         |      |
|---------|----------|--------------------|-----------------------------------------|------|-------|----------|------|------|----------|---------|------|
|         |          | NH <sub>3</sub> -N | NO <sub>3</sub> +<br>NO <sub>2</sub> -N | TN   | TP    | Hardness | Ca   | Mg   | Chloride | Sulfate | NFR  |
| 1       | 151798   | 0.049              | 0.42                                    | 0.73 | 0.050 | 193      | 57.5 | 11.9 | 49.0     | 38.7    | <5   |
| 2       | 151799   | 0.042              | 0.50                                    | 0.79 | 0.064 | 179      | 53.8 | 10.9 | 35.7     | 39.1    | <5   |
| 3a      | 151796   | 0.068              | 0.66                                    | 0.99 | 0.086 | 172      | 51.6 | 10.5 | 33.5     | 37.5    | <5   |
| 3b      | 151797   | 0.059              | 0.77                                    | 0.95 | 0.094 | 172      | 51.5 | 10.5 | 34.5     | 38.8    | <5   |
| 4       | 151800   | 0.27               | 1.13                                    | 1.73 | 0.24  | 183      | 53.5 | 12.1 | 39.0     | 53.0    | <5   |
| 5       | 151801   | 1.68*              | 1.16                                    | 3.47 | 0.62  | 190      | 55.9 | 12.3 | 58.9     | 60.1    | 5.00 |
| 6       | 151788   | 0.049              | <0.008                                  | 0.41 | 0.031 | 181      | 55.4 | 10.4 | 26.9     | 73.6    | 5.00 |

\*Exceeds WQS Acute Criteria for Cool and Warm Water Fisheries. All “less than” values are below detectable limits.

#### **5.4 Long-term Dissolved Oxygen, Temperature, and Specific Conductivity**

Data loggers were deployed during the typically low-flow summer season prior to the fall sampling season at Peruque Creek study Stations #1 and #3 for 10 days. Data loggers recorded DO (mg/L), temperature (°C), and specific conductivity (µS/cm) measurements every 15 minutes. They were deployed on July 29 and retrieved on August 8, 2014.

Dissolved oxygen results are illustrated graphically in Figure 1 for Station #1 and Figure 2 for Station #3. For all DO, temperature, and specific conductivity data, refer to Appendix B.

At Station #1, DO results ranged from 5.06 to 12.01 mg/L, with a mean of 7.62 mg/L. Dissolved oxygen values did not fall below 5.0 mg/L, the minimum allowable by the Water Quality Standards (MDNR 2014c), during the deployment period at Station #1.

At Station #3, DO results ranged from 2.63 to 13.63 mg/L, with a mean of 6.92 mg/L. Dissolved oxygen values fell below the minimum allowable concentration of 5.0 mg/L during almost every overnight period of the deployment period. Within approximately the last full day of the deployment period, there was a substantial rain that corresponded with DO results remaining above the 5.0 mg/L threshold. These observations contrast with the DO results during the prevailing dry, low-flow conditions recorded earlier in the deployment period.

Dissolved oxygen minimums and maximums exhibited trends according to time of day. The peak of DO levels occurred in the evening before sunset and the minimum DO levels occurred in the early morning before sunrise.

Relationships between DO and water temperature are presented for Peruque Creek Station #1 and #3 in Figures 3 and 4, respectively. The mean water temperature at Station #1 was 23.39°C, with a maximum of 27.01°C and a minimum of 20.14°C. The mean water temperature at Station #3 was 22.86 °C, with a maximum of 25.87°C and a minimum of 20.13°C.

Figure 1  
Station #1 Long-Term Dissolved Oxygen (mg/L)

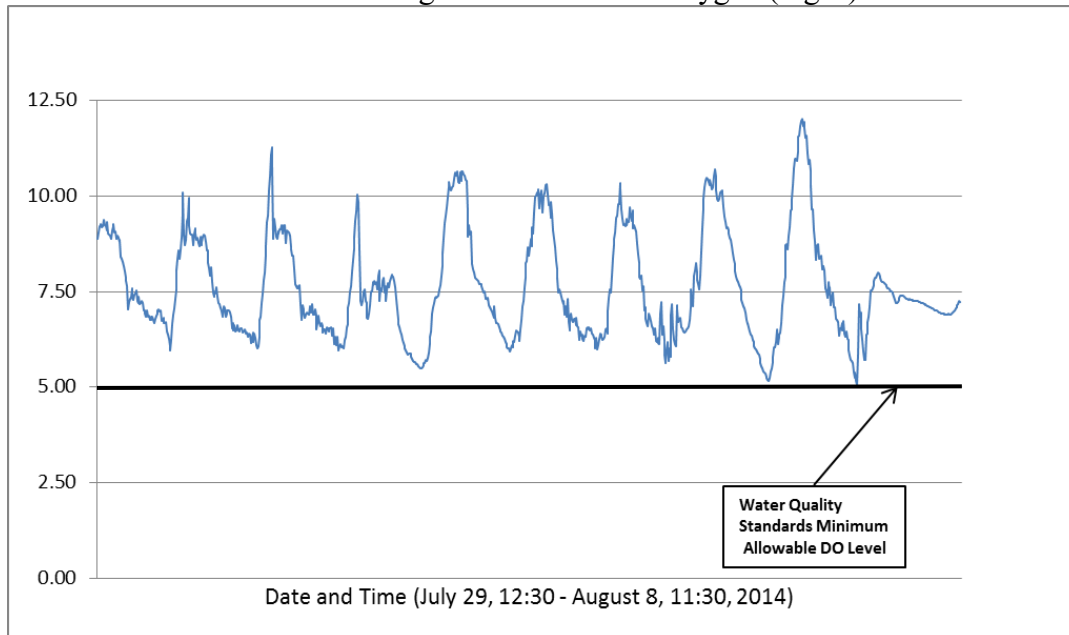
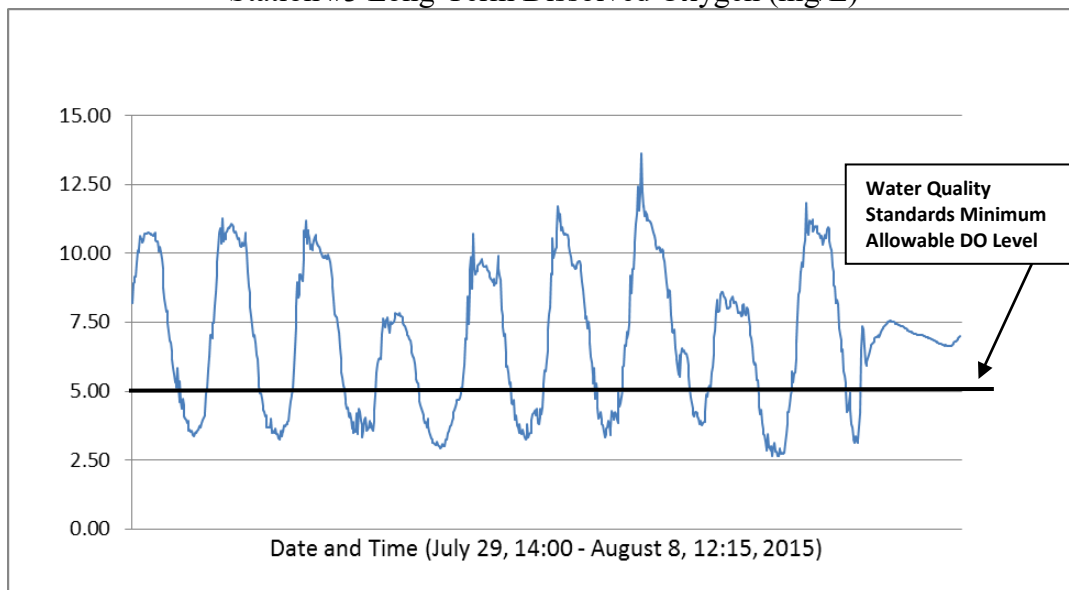
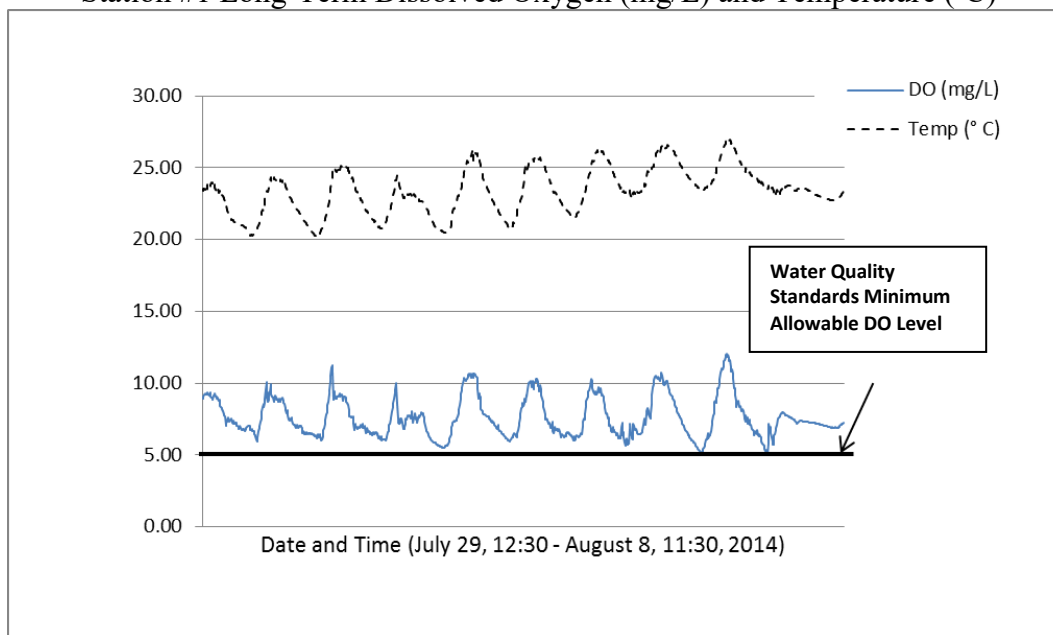


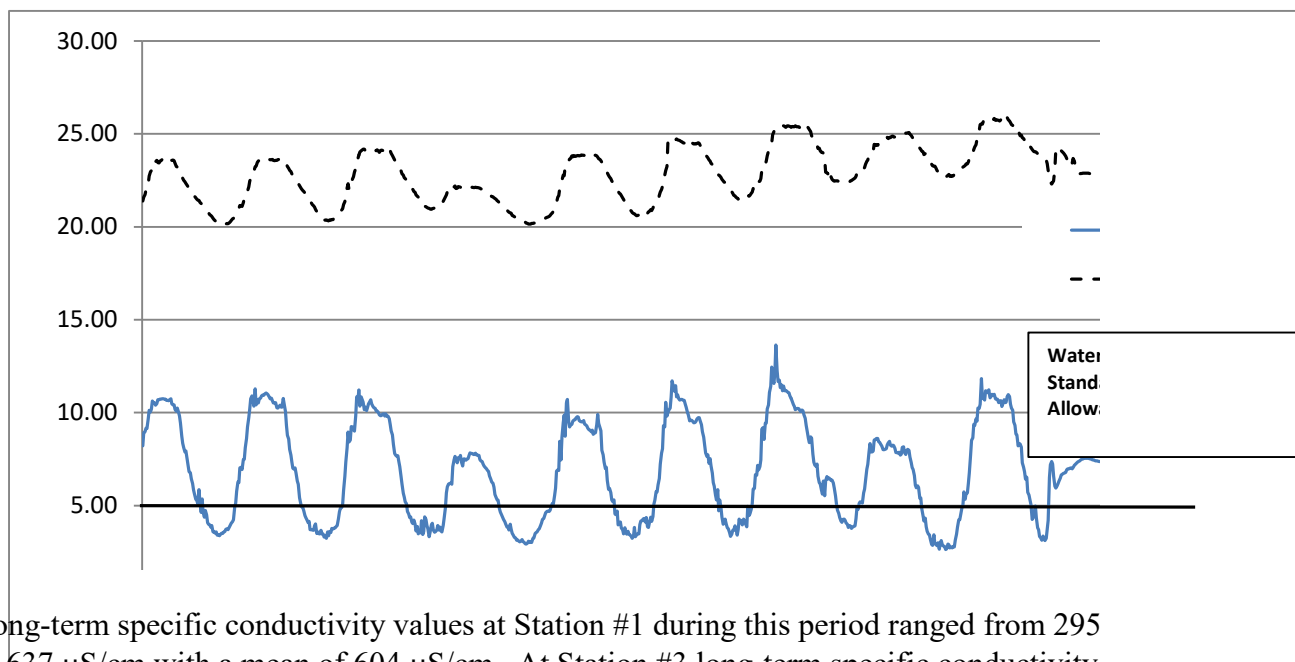
Figure 2  
Station #3 Long-Term Dissolved Oxygen (mg/L)



**Figure 3**  
 Station #1 Long-Term Dissolved Oxygen (mg/L) and Temperature (°C)



**Figure 4**  
 Station #3 Long-Term Dissolved Oxygen (mg/L) and Temperature (°C)



Long-term specific conductivity values at Station #1 during this period ranged from 295 to 637  $\mu\text{S}/\text{cm}$  with a mean of 604  $\mu\text{S}/\text{cm}$ . At Station #3 long-term specific conductivity ranged from 93 to 589  $\mu\text{S}/\text{cm}$  with a mean of 541  $\mu\text{S}/\text{cm}$ . For much of the long-term monitoring period, specific conductivity remained reasonably stable. However the minimum values occurred during the period of rain at the end of the monitoring period

when the level dropped and rebounded. For graphic representation of the specific conductivity values during the long-term monitoring period, see Figure 5 for Station #1 and Figure 6 for Station #3.

Figure 5  
Station #1 Long-Term Specific Conductivity ( $\mu\text{S}/\text{cm}$ )

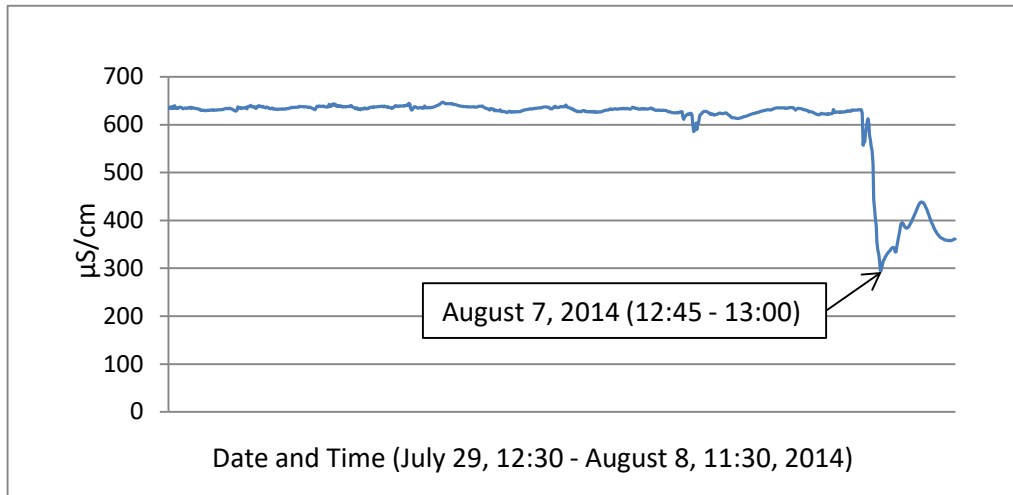
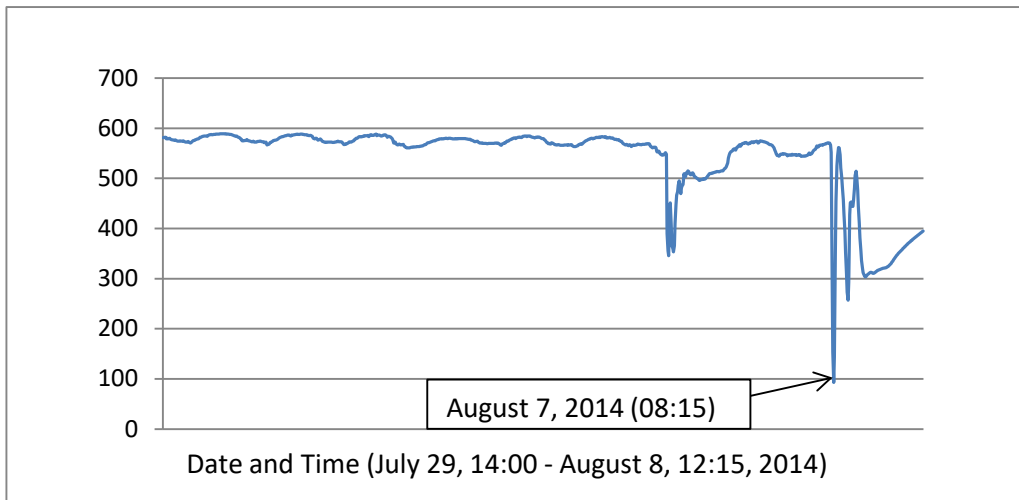


Figure 6  
Station #3 Long-Term Specific Conductivity ( $\mu\text{S}/\text{cm}$ )



## 5.5 Biological Assessment

### 5.5.1 Semi-quantitative Macroinvertebrate Stream Bioassessment Project Procedure (SMSBPP)

The SMSBPP evaluation used biological criteria that were calculated for the Central Plains/Cuivre/Salt EDU from ESP's Wadeable/Perennial Biological Reference Stream database. See Biological Criteria for Wadeable/Perennial Streams of Missouri (MDNR 2002) for more explanation. These criteria are listed for fall and spring seasons in Tables 8 and 9, respectively. Macroinvertebrate Stream Condition Index scores of 20-16 qualify as fully supporting, 14-10 as partially supporting, and 8-4 as non-supporting of the protection of warm water aquatic life beneficial use designation.

Table 8

Biological Criteria for Warm Water Reference Streams in the Central Plains/Cuivre/Salt EDU (Fall Season)

| Metric | Score = 5 | Score = 3 | Score =1 |
|--------|-----------|-----------|----------|
| TR     | >73       | 37-73     | <37      |
| EPTT   | >17       | 9-17      | <9       |
| BI     | <6.4      | 6.4-8.2   | >8.2     |
| SDI    | >2.99     | 1.49-2.99 | <1.49    |

Table 9

Biological Criteria for Warm Water Reference Streams in the Central Plains/Cuivre/Salt EDU (Spring Season)

| Metric | Score = 5 | Score = 3 | Score =1 |
|--------|-----------|-----------|----------|
| TR     | >77       | 39-77     | <39      |
| EPTT   | >17       | 9-17      | <9       |
| BI     | <6.3      | 6.3-8.1   | >8.1     |
| SDI    | >3.21     | 1.61-3.21 | <1.61    |

### 5.5.2 Comparisons with Biocriteria Reference Streams in the Central Plains/Cuivre/Salt EDU

Macroinvertebrate Stream Condition Index scores were calculated for Peruque Creek as derived from biological criteria from Central Plains/Cuivre/Salt EDU reference streams. The four metrics, total scores, and MSCI supportability rankings during fall 2014 and spring 2015 are presented in Tables 10 and 11, respectively. For comparison, scores and supportability rankings from the 2002 study (MDNR 2003) are included in these tables.



Table 10

Peruque Creek Metric Values (and Scores), MSCI Scores, and Supportability Rankings,  
 Fall 2014 (With Fall 2002 Scores and Rankings for Comparison)

| Station # | Sample # | TR     | EPTT   | BI       | SDI      | MSCI | Supportability   |
|-----------|----------|--------|--------|----------|----------|------|------------------|
| 1         | 14910    | 75 (5) | 11 (3) | 6.5 (3)  | 3.11 (5) | 16   | <b>Fully</b>     |
| 1 (2002)  | -        | 93 (5) | 18 (3) | 6.54 (3) | 3.58 (5) | 16   | <b>Fully</b>     |
| 2         | 14911    | 75 (5) | 12 (3) | 6.5 (3)  | 3.12 (5) | 16   | <b>Fully</b>     |
| 2 (2002)  | -        | 80 (5) | 19 (5) | 7.72 (3) | 3.29 (5) | 18   | <b>Fully</b>     |
| 3         | 14912    | 77 (5) | 13 (3) | 6.7 (3)  | 3.04 (5) | 16   | <b>Fully</b>     |
| 3 (2002)  | -        | 92 (5) | 18 (3) | 7.11 (3) | 3.50 (5) | 16   | <b>Fully</b>     |
| 4         | 14913    | 72 (3) | 9 (3)  | 7.1 (3)  | 3.04 (5) | 14   | <b>Partially</b> |
| 4 (2002)  | -        | 79 (5) | 16 (3) | 6.93 (3) | 3.11 (5) | 16   | <b>Fully</b>     |
| 5         | 14915    | 72 (3) | 8 (1)  | 6.7 (3)  | 3.08 (5) | 12   | <b>Partially</b> |
| 5 (2002)  | -        | 80 (5) | 10 (3) | 7.49 (3) | 3.07 (5) | 16   | <b>Fully</b>     |
| 6         | 14914    | 76 (5) | 7 (1)  | 6.9 (3)  | 3.10 (5) | 14   | <b>Partially</b> |
| 6 (2002)  | -        | 63 (3) | 4 (1)  | 7.77 (3) | 3.10 (5) | 12   | <b>Partially</b> |

Table 11

Peruque Creek Metric Values (and Scores), MSCI Scores, and Supportability Rankings,  
 Spring 2015 (With Spring 2002 Scores and Rankings for Comparison)

| Station # | Sample # | TR     | EPTT   | BI       | SDI      | MSCI | Supportability   |
|-----------|----------|--------|--------|----------|----------|------|------------------|
| 1         | 15016    | 74 (3) | 8 (1)  | 6.4 (3)  | 3.19 (3) | 10   | <b>Partially</b> |
| 1 (2002)  | -        | 96 (5) | 18 (5) | 7.07 (3) | 3.37 (5) | 18   | <b>Fully</b>     |
| 2         | 15017    | 76 (3) | 11 (3) | 7.0 (3)  | 3.13 (3) | 12   | <b>Partially</b> |
| 2 (2002)  | -        | 84 (5) | 18 (5) | 6.81 (3) | 3.30 (5) | 18   | <b>Fully</b>     |
| 3a        | 15014    | 79 (5) | 10 (3) | 6.7 (3)  | 3.08 (3) | 14   | <b>Partially</b> |
| 3b        | 15015    | 73 (3) | 10 (3) | 6.7 (3)  | 3.15 (3) | 12   | <b>Partially</b> |
| 3 (2002)  | -        | 82 (5) | 17 (3) | 7.25 (3) | 3.05 (3) | 14   | <b>Partially</b> |
| 4         | 15018    | 65 (3) | 3 (1)  | 7.6 (3)  | 2.91 (3) | 10   | <b>Partially</b> |
| 4 (2002)  | -        | 67 (3) | 12 (3) | 8.19 (1) | 2.19 (3) | 10   | <b>Partially</b> |
| 5         | 15019    | 63 (3) | 5 (1)  | 7.0 (3)  | 3.06 (3) | 10   | <b>Partially</b> |
| 5 (2002)  | -        | 67 (3) | 8 (3)  | 7.85 (3) | 2.60 (3) | 12   | <b>Partially</b> |
| 6         | 15020    | 67 (3) | 8 (1)  | 6.8 (3)  | 3.16 (3) | 10   | <b>Partially</b> |
| 6 (2002)  | -        | 75 (3) | 9 (3)  | 8.01 (3) | 2.66 (3) | 12   | <b>Partially</b> |

### 5.5.3 Peruque Creek Longitudinal Comparisons

Supportability rankings differed longitudinally among stations during the fall sampling season. The downstream three stations received a “fully” supporting ranking, and the upstream three stations received a “partially” supporting ranking. However, during the spring season all stations were consistent in receiving “partially” supporting rankings. During the fall, there was little difference in the MSCI scores when the three downstream stations scored a 16 and two of the upstream stations scored a 14 with only one scoring a

12. There was also little variation in MSCI scores among stations in spring with four stations receiving a 10, three receiving a 12, and one receiving a 14.

During the 2002 study, MSCI scores tended to be somewhat consistent for the fall season with the exception of the most upstream site. Scores were less consistent during the 2002 spring sampling, with MSCI results ranging from 10-18. One difference in metrics between the 2002 study and this study was the noticeably lower TR and EPTT values among stations in the current study (Tables 10 and 11).

#### **5.5.4 Peruque Creek Seasonal Comparisons**

Seasonal differences occurred in the downstream three stations. Each of these stations received “fully” supporting rankings in the fall and “partially” supporting rankings in the spring. For those upstream stations that received “partially” supporting rankings during both seasons, MSCI scores were higher during the fall season than the spring. Fall MSCI scores, which ranged from 12-16, trended higher than the spring scores, which ranged from 10-12. Four of the six spring MSCI scores were 10.

#### **5.5.5 Macroinvertebrate Percent and Community Composition**

Dominant macroinvertebrate community composition is presented in Table 12, including percent EPT and Diptera relative abundance as well as Coleoptera, which was another relevant dominant order at two stations during the fall 2014 sample season. The top five dominant families are also presented in Table 12 for both sampling seasons. The percent of relative abundance data were averaged from the sum of the three macroinvertebrate habitats (coarse substrate, depositional non-flow, and rootmat) sampled at each station. See Appendix C for all macroinvertebrate data.

Diptera was the dominant order at all stations during the spring sampling season. During the fall sampling season Coleoptera was the dominant order at Stations #1 and #5, Ephemeroptera was the dominant order at Stations # 3 and #4, and Diptera was the dominant order at Stations #2 and #6. Chironomidae was the dominant family in the spring at all stations, and during the fall, chironomids were dominant at Stations #2, #3, #4, and #6. Elmidae was the dominant family at Stations #1 and #5 during the fall sampling season.

One taxon that was noticeably absent from this study was Plecoptera. By comparison, the 2002 study had two stations in which Plecoptera made up just over six percent of the sample. Trichoptera were more abundant in the fall sampling season than the spring season when they were poorly represented. During both studies Trichoptera were similarly represented during both seasons.

**Table 12**  
**Peruque Creek Dominant Macroinvertebrate Composition**

|                                | Station # (Fall 2014) |    |    |    |    |    | Station # (Spring 2015) |    |    |     |    |    |    |
|--------------------------------|-----------------------|----|----|----|----|----|-------------------------|----|----|-----|----|----|----|
|                                | 1                     | 2  | 3  | 4  | 5  | 6  | 1                       | 2  | 3a | 3b* | 4  | 5  | 6  |
| % Ephemeroptera                | 23                    | 30 | 34 | 36 | 14 | 14 | 7                       | 10 | 8  | 7   | 9  | 0  | 3  |
| % Plecoptera                   | 0                     | 0  | 0  | 0  | 0  | 0  | 0                       | 0  | 0  | 0   | 0  | 0  | 0  |
| % Trichoptera                  | 8                     | 10 | 12 | 7  | 12 | 3  | 1                       | 1  | 2  | 2   | 1  | 4  | 2  |
| Total EPT %                    | 31                    | 40 | 46 | 43 | 26 | 17 | 8                       | 11 | 10 | 9   | 10 | 4  | 5  |
| % Diptera                      | 20                    | 36 | 24 | 31 | 26 | 48 | 78                      | 79 | 82 | 79  | 84 | 68 | 80 |
| Alternate, Most Dominant Order |                       |    |    |    |    |    |                         |    |    |     |    |    |    |
| Coleoptera                     | 28                    | -  | -  | -  | 28 | -  | -                       | -  | -  | -   | -  | -  | -  |
| % Top Five Dominant Families   |                       |    |    |    |    |    |                         |    |    |     |    |    |    |
| Chironomidae                   | 19                    | 34 | 23 | 30 | 25 | 46 | 78                      | 77 | 80 | 77  | 83 | 67 | 79 |
| Elmidae                        | 26                    | 13 | 14 |    | 27 | 16 | 3                       | 4  | 2  | 3   | 2  | 13 | 7  |
| Baetidae                       | 9                     | 10 | 11 | 10 | 8  | -  | -                       | -  | -  | -   | -  | -  | -  |
| Tubificidae                    | 8                     | -  | -  | -  | -  | -  | -                       | -  | -  | -   | 2  | 9  | 4  |
| Leptohyphidae                  | 6                     | -  | -  | -  | -  |    | -                       | -  | -  | -   | -  | -  | -  |
| Caenidae                       | -                     | 16 | 17 | 24 | -  | 12 | 2                       | 6  | 5  | 5   | 8  | -  | 3  |
| Hydropsychidae                 | -                     | 8  | 9  | 7  | 12 | -  | -                       | -  | -  | -   | -  | 4  | 1  |
| Coenagrionidae                 | -                     | -  | -  | 11 | 9  | -  | -                       | -  | 4  | 4   | -  | -  | -  |
| Planorbidae                    | -                     | -  | -  | -  | -  | 7  | -                       | -  | -  | -   | -  | -  | -  |
| Tubificidae                    | -                     | -  | -  | -  | -  | 4  | 4                       | 2  | -  | -   | -  | -  | -  |
| Heptageniidae                  | -                     | -  | -  | -  | -  | -  | -                       | 2  | 2  | 2   | 1  | -  | -  |
| Enchytraeidae                  | -                     | -  | -  | -  | -  | -  | -                       | -  | -  | -   | -  | 4  | -  |

Percentages rounded to whole numbers

\*QSI Spring Station #3 duplicates = 89.9%

- Taxon Not Applicable as Dominant

**Most dominant taxon in bold**

## 6.0 Discussion

### 6.1 Habitat/Land Use

As mentioned in Section 3.0, a benthic fine sediment deposition estimation study was to be conducted. When this part of the 2002 Peruque Creek study was conducted, Station #6 was the only station to have significantly higher fine sediment deposition than the control stream (MDNR 2003). Even though sediment estimation was not conducted, some information may be useful from stream habitat assessments. From Stations #1 to #6, percent sediment deposition results were 28, 28, 31, 32, 45, and 75, respectively. This provides some indication that overall sediment cover decreases from upstream to downstream.

Section 5.1 mentions the continued urbanization of the Peruque Creek watershed. This type of development can affect a stream in several ways. Development can create land and hydrologic disturbance that affects instream habitat for aquatic life such as sedimentation of available substrate (Li and Wang 2009). Aquatic life may also be affected by urbanization via runoff from impervious surfaces of a myriad of toxic

chemicals such as automobile fluids, pesticides, herbicides, and de-icing materials just to name a few (Sprague et al. 2007).

## **6.2 Physicochemical Data**

The one station with a nutrient concern at the pH and temperature measured was an  $\text{NH}_3\text{-N}$  exceedance at Station #5 during the spring sample season (see Section 5.3). This station is approximately 1200 m downstream of the Wright City wastewater treatment plant (WWTP) (See Sec. 2.1). The spring  $\text{NH}_3\text{-N}$  concentration at Station #5 was approximately 34 times higher than the  $\text{NH}_3\text{-N}$  concentration at Station #6, which was just upstream of the Wright City WWTP. Although not a violation of water quality standards, the Station #4  $\text{NH}_3\text{-N}$  concentration was 5.5 times higher than Station #6. Station #3, approximately 13 km (8 mi) downstream of the Wright City WWTP, was the first station to have  $\text{NH}_3\text{-N}$  concentrations similar to Station #6.

## **6.3 Long-term Dissolved Oxygen, Temperature, and Specific Conductivity**

Long-term DO data from Station #3 recorded DO levels below the minimum of 5.0 mg/L required by Missouri's Water Quality Standards (MDNR 2014c). During the 10 days of long-term DO monitoring, DO fell to levels as low as 2.63 mg/L. These low DO events tended to occur just before sunrise, whereas the high levels tended to occur around sunset.

Among the reasons DO levels can drop during the early morning hours is due to respiration of all organisms, including algae and other aquatic plant life, during the nighttime hours when photosynthesis does not occur. Considerable fluctuations in DO can be an indication of nutrient input that allows for excess algae populations. Photosynthesis by aquatic vegetation can raise DO during daylight hours, but a stream can have difficulty maintaining those levels without flow and aeration while all organisms in the ecosystem continue to undergo respiration during nighttime hours.

Among the physical features of streams that maintain adequate DO are flow and aeration. When there is no, or minimal flow, and when there is little to no aeration of the water such as in a riffle, DO levels can decline. The noticeable rise in the minimum DO level after a substantial rain event observed during data logger deployment is evidence of the effect flow can have on DO levels. As noted in Section 2.1, much of the study section was reduced to pools during the summer prior to the fall sample season. Low flow resulting in low DO cannot explain the failure of all Peruque Creek stations to receive fully supporting scores during the spring season, however.

## **6.4 Biological Assessment**

Only three of the thirteen macroinvertebrate samples (twelve sites including one duplicate) received “fully” supporting scores. There was a complete lack of Plecoptera taxa during this study, which is suggestive of problems for a riffle/pool stream such as Peruque Creek. Trichoptera taxa were present in very low percentages during the spring season; however, this was also the case in the 2002 study.

In addition to the biological data, other information from this study suggests problems with this reach of Peruque Creek that could affect macroinvertebrate communities. Seasonal fluctuations in DO, as measured during data logger deployment, are an indicator of potential ongoing DO violations within upper Peruque Creek. Additionally, an exceedance and other elevated levels in  $\text{NH}_3\text{-N}$  below the Wright City WWTP are indicators of potential chronic ammonia-nitrogen and possibly other nutrient issues.

### **6.5 Comparison with 2002 Study**

Of all the macroinvertebrate samples represented in this study, only the three downstream stations during the fall sampling season received “fully” supporting rankings. By contrast, the study conducted in 2002 resulted in seven of the overall twelve samples receiving “fully” supporting rankings (five during the fall and two during the spring). Overall MSCI scores were noticeably lower than those in the 2002 study and TR and EPTT scores for each sample station per season were lower than those for the 2002 study. One other notable difference was with respect to Plecoptera. Whereas this sensitive taxa group was collected during the 2002 study, this study had a complete lack of Plecoptera.

This comparison of results suggests a general decline in the ability of the Peruque Creek study segment to fully support the protection of warm water aquatic life beneficial use designation.

### **7.0 Null Hypotheses Summary**

- The null hypothesis that macroinvertebrate assemblages are similar between Peruque Creek and BIOREF streams in the same EDU is rejected.
- The null hypothesis that macroinvertebrate assemblages are similar among Peruque Creek stations is rejected for the fall season and accepted for the spring season.\*
- The null hypothesis that macroinvertebrate assemblages will not differ between the two sample seasons is rejected.\*
- The null hypothesis that habitat quality is similar among Peruque Creek stations is accepted.
- The null hypothesis that habitat quality is similar between Peruque Creek and biocriteria reference streams is accepted.

\*These conclusions are based more on overall MSCI scores than supportability rankings. See Sections 5.5.3 and 5.5.4.

### **8.0 Literature Cited**

Li, Y. and C. Wang. 2009. Impacts of Urbanization on Surface Runoff of the Dardenne Creek Watershed, St. Charles County, Missouri. *Physical Geography* 30(6): 556-573.

Missouri Department of Natural Resources. 2002. Biological Criteria for Wadeable/Perennial Streams of Missouri. Missouri Department of Natural

- Resources, Environmental Services Program, P.O. Box 176, Jefferson City, Missouri 65102. 32 pp.
- Missouri Department of Natural Resources. 2003. Biological Assessment Report, Peruque Creek, St. Charles and Warren Counties. June 12, 2003. Missouri Department of Natural Resources, Environmental Services Program, P. O. Box 176 Jefferson City, MO 65102.  
<http://dnr.mo.gov/env/esp/docs/PeruqueCreekFinalReport.pdf>
- Missouri Department of Natural Resources. 2010a. Standard Operating Procedure MDNR-ESP-102: Field Analysis for Specific Conductance. Missouri Department of Natural Resources, Environmental Services Program, P.O. Box 176, Jefferson City, Missouri 65102. 15 pp.
- Missouri Department of Natural Resources. 2010b. Standard Operating Procedure MDNR-ESP-101: Field Measurement of Water Temperature. Missouri Department of Natural Resources, Environmental Services Program, P.O. Box 176, Jefferson City, Missouri 65102. 2 pp.
- Missouri Department of Natural Resources. 2010c. Stream Habitat Assessment Project Procedure (SHAPP). Missouri Department of Natural Resources, Environmental Services Program, P.O. Box 176, Jefferson City, Missouri 65102. 40 pp.
- Missouri Department of Natural Resources. 2010d. Standard Operating Procedure MDNR-ESP-213: Quality Control Procedures for Checking Water Quality Field Instruments. Missouri Department of Natural Resources, Environmental Services Program, P.O. Box 176, Jefferson City, Missouri 65102. 14 pp.
- Missouri Department of Natural Resources. 2012a. Standard Operating Procedure MDNR-ESP-100: Field Analysis of Water Samples for pH. Missouri Department of Natural Resources, Environmental Services Program, P.O. Box 176, Jefferson City, Missouri 65102. 10 pp.
- Missouri Department of Natural Resources. 2012b. Standard Operating Procedure MDNR-ESP-103: Sample Collection and Field Analysis for Dissolved Oxygen Using a YSI Membrane Electrode Meter, Hach HQ40d LDO Probe or YSI Pro ODO Probe. Missouri Department of Natural Resources, Environmental Services Program, P.O. Box 176, Jefferson City, Missouri 65102. 13 pp.
- Missouri Department of Natural Resources. 2012c. Semi-quantitative Macroinvertebrate Stream Bioassessment Project Procedure. Missouri Department of Natural Resources, Environmental Services Program, P.O. Box 176, Jefferson City, Missouri 65102. 24 pp.

Missouri Department of Natural Resources. 2013. Standard Operating Procedure MDNR-ESP-113: Flow Measurement in Open Channels. Missouri Department of Natural Resources, Environmental Services Program, P.O. Box 176, Jefferson City, Missouri 65102. 9 pp.

Missouri Department of Natural Resources. 2014a. Standard Operating Procedure MDNR-ESP-104: Continuous or Long-Term Monitoring of Water Quality Using a Dissolved Oxygen, Specific Conductivity, pH, Turbidity, Rhodamine Dye, and Temperature Data Logger. Missouri Department of Natural Resources, Environmental Services Program, P. O. Box 176, Jefferson City, Jefferson City, Missouri 65102. 10pp.

Missouri Department of Natural Resources. 2014b. Standard Operating Procedure MDNR-ESP-115: Estimation of Benthic Fine Sediment Coverage in Wadeable Streams. Missouri Department of Natural Resources, Environmental Services Program, P. O. Box 176, Jefferson City, Jefferson City, Missouri 65102. 14pp.

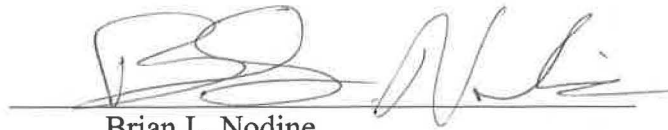
Missouri Department of Natural Resources. 2014c. Title 10. Rules of Department of Natural Resources Division 20-Clean Water Commission, Chapter 7-Water Quality. 10 CSR 20-7.031 Water Quality Standards. Missouri Department of Natural Resources, Water Pollution Control Program, P.O. Box 176, Jefferson City, Missouri 65102. pp. 1-135.

Missouri Department of Natural Resources. 2014d. Standard Operating Procedure MDNR-ESP-214: Quality Control Procedures for Data Processing. Missouri Department of Natural Resources, Environmental Services Program, P.O. Box 176, Jefferson City, Missouri 65102. 7 pp.

Missouri Department of Natural Resources. 2015. Total Maximum Daily Load Information Sheet, Peruque Creek. Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102. <http://dnr.mo.gov/env/wpp/tmdl/info/docs/0217-0218-peruque-ck-info.pdf> 3pp.

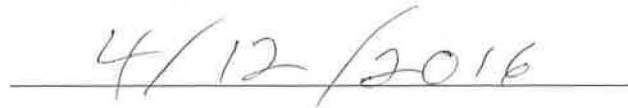
Sprague, L.A., D.A. Harned, D.W. Hall, L.H. Nowell, N.J. Bauch, and K.D. Richards 2007. Response of Stream Chemistry During Base Flow to Gradients of Urbanization in Selected Locations Across the Conterminous United States, 2002-04. United States Geological Survey Scientific Investigations Report 2007-5083, 133 pp.

Submitted by:



Brian L. Nodine  
Environmental Specialist III  
Water Quality Monitoring Section  
Environmental Services Program

Date:



Approved by:



Lynn Milberg  
Water Quality Monitoring Section Chief  
Environmental Services Program

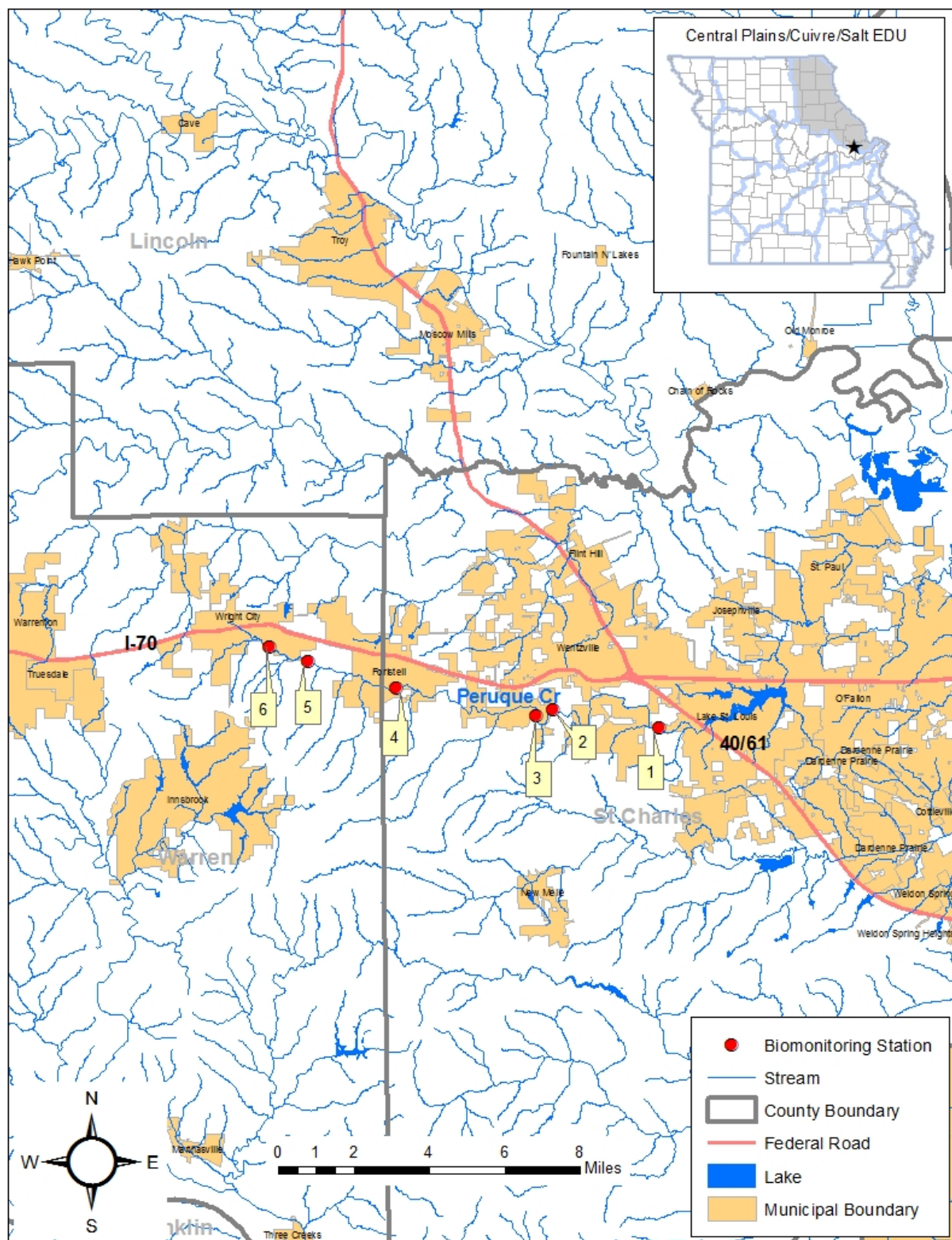
LM:bnc

cc: Dorothy Franklin, Regional Director, SLRO  
Trish Rielly, QAPP Project Manager, WPP



## **Appendix A**

### Peruque Creek Study Area Map



## Appendix B

### Dissolved Oxygen, Temperature, and Specific Conductivity Data Logger Results

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/29/2014 12:30:31                    | 23.41     | 634          | 8.88    |
| 07/29/2014 12:45:31                    | 23.51     | 636          | 9.05    |
| 07/29/2014 13:00:31                    | 23.50     | 637          | 9.21    |
| 07/29/2014 13:15:31                    | 23.46     | 634          | 9.22    |
| 07/29/2014 13:30:31                    | 23.53     | 637          | 9.27    |
| 07/29/2014 13:45:31                    | 23.33     | 635          | 9.19    |
| 07/29/2014 14:00:31                    | 23.80     | 634          | 9.20    |
| 07/29/2014 14:15:31                    | 23.42     | 640          | 9.37    |
| 07/29/2014 14:30:32                    | 23.37     | 635          | 9.24    |
| 07/29/2014 14:45:32                    | 23.38     | 634          | 9.21    |
| 07/29/2014 15:00:32                    | 23.45     | 635          | 9.10    |
| 07/29/2014 15:15:31                    | 23.56     | 634          | 9.32    |
| 07/29/2014 15:30:32                    | 23.82     | 635          | 9.03    |
| 07/29/2014 15:45:32                    | 23.94     | 637          | 8.99    |
| 07/29/2014 16:00:31                    | 23.89     | 636          | 8.97    |
| 07/29/2014 16:15:31                    | 23.95     | 636          | 8.87    |
| 07/29/2014 16:30:32                    | 23.58     | 635          | 9.10    |
| 07/29/2014 16:45:32                    | 23.81     | 633          | 9.20    |
| 07/29/2014 17:00:32                    | 23.61     | 634          | 9.27    |
| 07/29/2014 17:15:32                    | 23.48     | 635          | 9.05    |
| 07/29/2014 17:30:32                    | 23.42     | 635          | 9.06    |
| 07/29/2014 17:45:31                    | 23.34     | 634          | 8.89    |
| 07/29/2014 18:00:32                    | 23.51     | 634          | 8.95    |
| 07/29/2014 18:15:32                    | 23.62     | 635          | 8.91    |
| 07/29/2014 18:30:31                    | 23.23     | 636          | 8.79    |
| 07/29/2014 18:45:31                    | 23.36     | 636          | 8.85    |
| 07/29/2014 19:00:31                    | 23.11     | 634          | 8.41    |
| 07/29/2014 19:15:32                    | 23.23     | 636          | 8.36    |
| 07/29/2014 19:30:31                    | 23.11     | 634          | 8.26    |
| 07/29/2014 19:45:32                    | 23.09     | 635          | 8.16    |
| 07/29/2014 20:00:32                    | 23.03     | 635          | 8.03    |
| 07/29/2014 20:15:32                    | 22.88     | 635          | 7.86    |
| 07/29/2014 20:30:31                    | 22.80     | 634          | 7.78    |
| 07/29/2014 20:45:31                    | 22.63     | 634          | 7.65    |
| 07/29/2014 21:00:31                    | 22.28     | 634          | 7.03    |
| 07/29/2014 21:15:31                    | 22.35     | 633          | 7.24    |
| 07/29/2014 21:30:31                    | 22.05     | 633          | 7.31    |
| 07/29/2014 21:45:31                    | 21.97     | 632          | 7.38    |
| 07/29/2014 22:00:32                    | 21.83     | 632          | 7.59    |
| 07/29/2014 22:15:31                    | 21.84     | 630          | 7.34    |
| 07/29/2014 22:30:31                    | 21.63     | 630          | 7.28    |
| 07/29/2014 22:45:31                    | 21.60     | 630          | 7.42    |
| 07/29/2014 23:00:32                    | 21.48     | 630          | 7.44    |
| 07/29/2014 23:15:32                    | 21.36     | 630          | 7.53    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/29/2014 23:30:31                    | 21.35     | 629          | 7.26    |
| 07/29/2014 23:45:31                    | 21.34     | 629          | 7.19    |
| 07/30/2014 00:00:32                    | 21.27     | 630          | 7.36    |
| 07/30/2014 00:15:32                    | 21.19     | 630          | 7.19    |
| 07/30/2014 00:30:31                    | 21.17     | 630          | 7.20    |
| 07/30/2014 00:45:32                    | 21.21     | 630          | 7.26    |
| 07/30/2014 01:00:32                    | 21.16     | 630          | 7.21    |
| 07/30/2014 01:15:31                    | 21.11     | 630          | 7.00    |
| 07/30/2014 01:30:31                    | 21.11     | 631          | 7.01    |
| 07/30/2014 01:45:32                    | 21.06     | 631          | 6.91    |
| 07/30/2014 02:00:31                    | 21.08     | 630          | 6.83    |
| 07/30/2014 02:15:31                    | 21.03     | 631          | 7.00    |
| 07/30/2014 02:30:32                    | 21.03     | 630          | 6.85    |
| 07/30/2014 02:45:32                    | 21.01     | 630          | 6.88    |
| 07/30/2014 03:00:32                    | 20.97     | 631          | 6.75    |
| 07/30/2014 03:15:32                    | 20.99     | 630          | 6.76    |
| 07/30/2014 03:30:31                    | 20.98     | 631          | 6.84    |
| 07/30/2014 03:45:32                    | 20.93     | 631          | 6.84    |
| 07/30/2014 04:00:32                    | 20.83     | 631          | 6.75    |
| 07/30/2014 04:15:31                    | 20.83     | 631          | 6.66    |
| 07/30/2014 04:30:32                    | 20.85     | 631          | 6.78    |
| 07/30/2014 04:45:32                    | 20.75     | 632          | 6.87    |
| 07/30/2014 05:00:31                    | 20.71     | 632          | 6.93    |
| 07/30/2014 05:15:32                    | 20.62     | 633          | 7.01    |
| 07/30/2014 05:30:32                    | 20.52     | 633          | 7.05    |
| 07/30/2014 05:45:32                    | 20.48     | 634          | 6.99    |
| 07/30/2014 06:00:32                    | 20.40     | 634          | 7.00    |
| 07/30/2014 06:15:31                    | 20.28     | 634          | 6.72    |
| 07/30/2014 06:30:32                    | 20.30     | 633          | 6.76    |
| 07/30/2014 06:45:32                    | 20.30     | 634          | 6.80    |
| 07/30/2014 07:00:32                    | 20.26     | 635          | 6.69    |
| 07/30/2014 07:15:32                    | 20.32     | 633          | 6.67    |
| 07/30/2014 07:30:32                    | 20.39     | 633          | 6.69    |
| 07/30/2014 07:45:32                    | 20.43     | 632          | 6.45    |
| 07/30/2014 08:00:32                    | 20.48     | 632          | 6.36    |
| 07/30/2014 08:15:31                    | 20.59     | 630          | 6.27    |
| 07/30/2014 08:30:32                    | 20.69     | 629          | 6.06    |
| 07/30/2014 08:45:32                    | 20.72     | 628          | 5.94    |
| 07/30/2014 09:00:32                    | 20.83     | 628          | 6.23    |
| 07/30/2014 09:15:32                    | 20.97     | 631          | 6.64    |
| 07/30/2014 09:30:32                    | 21.14     | 637          | 6.89    |
| 07/30/2014 09:45:32                    | 21.43     | 636          | 7.05    |
| 07/30/2014 10:00:32                    | 21.55     | 634          | 7.32    |
| 07/30/2014 10:15:32                    | 21.70     | 636          | 7.55    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/30/2014 10:30:31                    | 21.91     | 634          | 8.05    |
| 07/30/2014 10:45:31                    | 22.05     | 635          | 8.35    |
| 07/30/2014 11:00:31                    | 21.93     | 635          | 8.57    |
| 07/30/2014 11:15:31                    | 21.96     | 635          | 8.36    |
| 07/30/2014 11:30:31                    | 22.34     | 635          | 8.60    |
| 07/30/2014 11:45:31                    | 23.00     | 635          | 8.94    |
| 07/30/2014 12:00:31                    | 23.17     | 636          | 9.53    |
| 07/30/2014 12:15:32                    | 23.20     | 633          | 10.10   |
| 07/30/2014 12:30:32                    | 23.40     | 637          | 8.99    |
| 07/30/2014 12:45:31                    | 23.33     | 639          | 8.73    |
| 07/30/2014 13:00:32                    | 23.60     | 638          | 8.84    |
| 07/30/2014 13:15:32                    | 23.69     | 638          | 9.34    |
| 07/30/2014 13:30:31                    | 24.12     | 640          | 9.43    |
| 07/30/2014 13:45:31                    | 24.36     | 637          | 9.96    |
| 07/30/2014 14:00:31                    | 24.09     | 637          | 9.20    |
| 07/30/2014 14:15:31                    | 23.90     | 638          | 9.02    |
| 07/30/2014 14:30:32                    | 23.91     | 637          | 8.98    |
| 07/30/2014 14:45:32                    | 24.00     | 637          | 9.00    |
| 07/30/2014 15:00:31                    | 24.34     | 634          | 8.70    |
| 07/30/2014 15:15:31                    | 24.19     | 636          | 9.01    |
| 07/30/2014 15:30:31                    | 24.15     | 638          | 9.16    |
| 07/30/2014 15:45:32                    | 24.10     | 638          | 9.01    |
| 07/30/2014 16:00:32                    | 24.08     | 640          | 8.87    |
| 07/30/2014 16:15:32                    | 24.19     | 638          | 8.90    |
| 07/30/2014 16:30:31                    | 24.21     | 638          | 8.76    |
| 07/30/2014 16:45:31                    | 24.15     | 637          | 8.69    |
| 07/30/2014 17:00:31                    | 24.18     | 638          | 8.93    |
| 07/30/2014 17:15:31                    | 24.15     | 636          | 8.71    |
| 07/30/2014 17:30:32                    | 24.05     | 636          | 8.80    |
| 07/30/2014 17:45:32                    | 24.01     | 636          | 8.92    |
| 07/30/2014 18:00:31                    | 24.08     | 635          | 8.98    |
| 07/30/2014 18:15:31                    | 23.98     | 637          | 8.96    |
| 07/30/2014 18:30:32                    | 24.01     | 636          | 8.79    |
| 07/30/2014 18:45:32                    | 23.83     | 636          | 8.59    |
| 07/30/2014 19:00:31                    | 24.00     | 634          | 8.57    |
| 07/30/2014 19:15:32                    | 23.73     | 634          | 8.24    |
| 07/30/2014 19:30:31                    | 23.68     | 633          | 8.12    |
| 07/30/2014 19:45:32                    | 23.52     | 634          | 7.90    |
| 07/30/2014 20:00:32                    | 23.41     | 635          | 8.13    |
| 07/30/2014 20:15:32                    | 23.32     | 632          | 7.74    |
| 07/30/2014 20:30:31                    | 23.08     | 633          | 7.48    |
| 07/30/2014 20:45:32                    | 23.04     | 632          | 7.37    |
| 07/30/2014 21:00:32                    | 22.94     | 632          | 7.50    |
| 07/30/2014 21:15:31                    | 22.87     | 632          | 7.43    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/30/2014 21:30:31                    | 22.73     | 632          | 7.60    |
| 07/30/2014 21:45:31                    | 22.67     | 632          | 7.36    |
| 07/30/2014 22:00:31                    | 22.55     | 632          | 7.19    |
| 07/30/2014 22:15:31                    | 22.50     | 632          | 7.17    |
| 07/30/2014 22:30:32                    | 22.45     | 632          | 7.06    |
| 07/30/2014 22:45:32                    | 22.39     | 632          | 7.10    |
| 07/30/2014 23:00:32                    | 22.22     | 633          | 6.99    |
| 07/30/2014 23:15:31                    | 22.16     | 633          | 6.85    |
| 07/30/2014 23:30:32                    | 22.11     | 633          | 7.12    |
| 07/30/2014 23:45:31                    | 22.04     | 633          | 7.07    |
| 07/31/2014 00:00:31                    | 21.99     | 633          | 6.85    |
| 07/31/2014 00:15:31                    | 21.92     | 633          | 6.92    |
| 07/31/2014 00:30:31                    | 21.83     | 634          | 7.00    |
| 07/31/2014 00:45:32                    | 21.77     | 634          | 7.02    |
| 07/31/2014 01:00:31                    | 21.74     | 634          | 6.99    |
| 07/31/2014 01:15:31                    | 21.61     | 635          | 6.96    |
| 07/31/2014 01:30:31                    | 21.58     | 635          | 6.84    |
| 07/31/2014 01:45:32                    | 21.45     | 635          | 6.53    |
| 07/31/2014 02:00:31                    | 21.38     | 636          | 6.66    |
| 07/31/2014 02:15:31                    | 21.30     | 636          | 6.47    |
| 07/31/2014 02:30:32                    | 21.31     | 636          | 6.61    |
| 07/31/2014 02:45:32                    | 21.17     | 636          | 6.46    |
| 07/31/2014 03:00:31                    | 21.12     | 636          | 6.47    |
| 07/31/2014 03:15:32                    | 21.08     | 636          | 6.62    |
| 07/31/2014 03:30:32                    | 20.99     | 636          | 6.48    |
| 07/31/2014 03:45:32                    | 20.90     | 637          | 6.45    |
| 07/31/2014 04:00:32                    | 20.88     | 637          | 6.50    |
| 07/31/2014 04:15:32                    | 20.79     | 638          | 6.54    |
| 07/31/2014 04:30:32                    | 20.77     | 638          | 6.55    |
| 07/31/2014 04:45:32                    | 20.66     | 638          | 6.44    |
| 07/31/2014 05:00:31                    | 20.57     | 638          | 6.46    |
| 07/31/2014 05:15:32                    | 20.53     | 638          | 6.52    |
| 07/31/2014 05:30:32                    | 20.49     | 637          | 6.43    |
| 07/31/2014 05:45:32                    | 20.44     | 637          | 6.39    |
| 07/31/2014 06:00:32                    | 20.41     | 638          | 6.41    |
| 07/31/2014 06:15:32                    | 20.29     | 637          | 6.33    |
| 07/31/2014 06:30:32                    | 20.27     | 637          | 6.40    |
| 07/31/2014 06:45:31                    | 20.28     | 637          | 6.37    |
| 07/31/2014 07:00:32                    | 20.14     | 636          | 6.16    |
| 07/31/2014 07:15:32                    | 20.18     | 637          | 6.28    |
| 07/31/2014 07:30:32                    | 20.24     | 636          | 6.43    |
| 07/31/2014 07:45:32                    | 20.28     | 635          | 6.19    |
| 07/31/2014 08:00:32                    | 20.40     | 635          | 6.41    |
| 07/31/2014 08:15:32                    | 20.50     | 634          | 6.28    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/31/2014 08:30:32                    | 20.61     | 633          | 6.09    |
| 07/31/2014 08:45:32                    | 20.67     | 632          | 6.02    |
| 07/31/2014 09:00:31                    | 20.80     | 631          | 6.06    |
| 07/31/2014 09:15:32                    | 20.94     | 635          | 6.32    |
| 07/31/2014 09:30:32                    | 21.14     | 639          | 6.76    |
| 07/31/2014 09:45:32                    | 21.30     | 639          | 6.85    |
| 07/31/2014 10:00:32                    | 21.39     | 638          | 7.19    |
| 07/31/2014 10:15:31                    | 21.53     | 639          | 7.45    |
| 07/31/2014 10:30:32                    | 21.72     | 638          | 7.81    |
| 07/31/2014 10:45:32                    | 21.86     | 638          | 7.99    |
| 07/31/2014 11:00:31                    | 22.13     | 638          | 8.47    |
| 07/31/2014 11:15:31                    | 22.40     | 638          | 8.72    |
| 07/31/2014 11:30:31                    | 22.64     | 639          | 9.31    |
| 07/31/2014 11:45:31                    | 22.90     | 638          | 9.48    |
| 07/31/2014 12:00:31                    | 23.41     | 638          | 10.14   |
| 07/31/2014 12:15:31                    | 23.57     | 637          | 10.54   |
| 07/31/2014 12:30:32                    | 23.97     | 637          | 11.08   |
| 07/31/2014 12:45:32                    | 24.18     | 637          | 11.27   |
| 07/31/2014 13:00:31                    | 24.76     | 637          | 10.75   |
| 07/31/2014 13:15:32                    | 24.67     | 642          | 8.87    |
| 07/31/2014 13:30:31                    | 24.74     | 641          | 9.42    |
| 07/31/2014 13:45:31                    | 25.00     | 638          | 9.18    |
| 07/31/2014 14:00:31                    | 24.78     | 641          | 8.94    |
| 07/31/2014 14:15:31                    | 24.70     | 641          | 8.89    |
| 07/31/2014 14:30:31                    | 24.76     | 643          | 9.08    |
| 07/31/2014 14:45:31                    | 24.83     | 641          | 9.03    |
| 07/31/2014 15:00:32                    | 24.86     | 643          | 9.13    |
| 07/31/2014 15:15:31                    | 25.03     | 642          | 9.14    |
| 07/31/2014 15:30:31                    | 25.12     | 638          | 9.25    |
| 07/31/2014 15:45:31                    | 24.86     | 639          | 9.03    |
| 07/31/2014 16:00:31                    | 25.15     | 640          | 9.23    |
| 07/31/2014 16:15:31                    | 25.03     | 638          | 9.11    |
| 07/31/2014 16:30:31                    | 25.01     | 639          | 9.23    |
| 07/31/2014 16:45:31                    | 25.07     | 639          | 8.76    |
| 07/31/2014 17:00:31                    | 25.15     | 639          | 9.09    |
| 07/31/2014 17:15:31                    | 25.12     | 637          | 9.08    |
| 07/31/2014 17:30:31                    | 25.22     | 637          | 9.05    |
| 07/31/2014 17:45:31                    | 25.15     | 638          | 8.95    |
| 07/31/2014 18:00:31                    | 25.05     | 637          | 8.67    |
| 07/31/2014 18:15:31                    | 24.97     | 638          | 8.61    |
| 07/31/2014 18:30:31                    | 24.98     | 637          | 8.44    |
| 07/31/2014 18:45:32                    | 24.79     | 638          | 8.44    |
| 07/31/2014 19:00:31                    | 24.75     | 639          | 8.08    |
| 07/31/2014 19:15:31                    | 24.49     | 638          | 7.70    |



| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/31/2014 19:30:31                    | 24.49     | 638          | 7.65    |
| 07/31/2014 19:45:31                    | 24.26     | 640          | 7.58    |
| 07/31/2014 20:00:31                    | 24.17     | 640          | 7.65    |
| 07/31/2014 20:15:31                    | 24.31     | 637          | 7.58    |
| 07/31/2014 20:30:31                    | 24.09     | 637          | 7.66    |
| 07/31/2014 20:45:32                    | 23.80     | 636          | 7.16    |
| 07/31/2014 21:00:32                    | 23.63     | 635          | 6.76    |
| 07/31/2014 21:15:31                    | 23.68     | 633          | 7.14    |
| 07/31/2014 21:30:32                    | 23.49     | 634          | 7.04    |
| 07/31/2014 21:45:32                    | 23.33     | 635          | 6.95    |
| 07/31/2014 22:00:32                    | 23.35     | 632          | 6.81    |
| 07/31/2014 22:15:31                    | 23.21     | 633          | 6.90    |
| 07/31/2014 22:30:32                    | 23.04     | 633          | 6.96    |
| 07/31/2014 22:45:32                    | 23.10     | 631          | 6.93    |
| 07/31/2014 23:00:32                    | 22.85     | 633          | 6.91    |
| 07/31/2014 23:15:32                    | 22.88     | 633          | 7.10    |
| 07/31/2014 23:30:32                    | 22.72     | 634          | 7.03    |
| 07/31/2014 23:45:32                    | 22.73     | 632          | 6.95    |
| 08/01/2014 00:00:31                    | 22.51     | 635          | 7.16    |
| 08/01/2014 00:15:32                    | 22.53     | 634          | 6.91    |
| 08/01/2014 00:30:31                    | 22.49     | 633          | 6.89    |
| 08/01/2014 00:45:32                    | 22.31     | 633          | 7.02    |
| 08/01/2014 01:00:31                    | 22.17     | 634          | 6.86    |
| 08/01/2014 01:15:31                    | 22.03     | 634          | 6.52    |
| 08/01/2014 01:30:31                    | 21.95     | 636          | 6.69    |
| 08/01/2014 01:45:31                    | 22.01     | 636          | 6.88    |
| 08/01/2014 02:00:31                    | 21.87     | 637          | 6.68    |
| 08/01/2014 02:15:31                    | 21.79     | 637          | 6.58    |
| 08/01/2014 02:30:31                    | 21.71     | 637          | 6.69    |
| 08/01/2014 02:45:31                    | 21.69     | 636          | 6.59    |
| 08/01/2014 03:00:31                    | 21.54     | 637          | 6.42    |
| 08/01/2014 03:15:32                    | 21.50     | 637          | 6.50    |
| 08/01/2014 03:30:32                    | 21.44     | 637          | 6.52    |
| 08/01/2014 03:45:31                    | 21.42     | 637          | 6.39    |
| 08/01/2014 04:00:32                    | 21.35     | 638          | 6.57    |
| 08/01/2014 04:15:32                    | 21.35     | 638          | 6.54    |
| 08/01/2014 04:30:31                    | 21.24     | 638          | 6.44    |
| 08/01/2014 04:45:31                    | 21.29     | 638          | 6.55    |
| 08/01/2014 05:00:31                    | 21.16     | 638          | 6.53    |
| 08/01/2014 05:15:32                    | 21.06     | 639          | 6.57    |
| 08/01/2014 05:30:32                    | 21.02     | 638          | 6.34    |
| 08/01/2014 05:45:32                    | 21.07     | 637          | 6.54    |
| 08/01/2014 06:00:32                    | 20.82     | 639          | 6.13    |
| 08/01/2014 06:15:32                    | 20.88     | 638          | 6.33    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/01/2014 06:30:32                    | 20.85     | 637          | 6.21    |
| 08/01/2014 06:45:31                    | 20.79     | 637          | 6.08    |
| 08/01/2014 07:00:31                    | 20.76     | 638          | 6.33    |
| 08/01/2014 07:15:31                    | 20.76     | 636          | 5.97    |
| 08/01/2014 07:30:31                    | 20.78     | 636          | 6.07    |
| 08/01/2014 07:45:32                    | 20.86     | 636          | 6.11    |
| 08/01/2014 08:00:32                    | 20.95     | 635          | 6.04    |
| 08/01/2014 08:15:32                    | 21.11     | 634          | 6.07    |
| 08/01/2014 08:30:32                    | 21.14     | 635          | 6.07    |
| 08/01/2014 08:45:32                    | 21.22     | 635          | 6.02    |
| 08/01/2014 09:00:31                    | 21.36     | 637          | 6.23    |
| 08/01/2014 09:15:32                    | 21.50     | 639          | 6.33    |
| 08/01/2014 09:30:32                    | 21.69     | 640          | 6.58    |
| 08/01/2014 09:45:32                    | 21.75     | 639          | 6.66    |
| 08/01/2014 10:00:32                    | 21.85     | 638          | 7.09    |
| 08/01/2014 10:15:31                    | 22.07     | 638          | 7.20    |
| 08/01/2014 10:30:31                    | 22.16     | 639          | 7.51    |
| 08/01/2014 10:45:31                    | 22.37     | 639          | 7.64    |
| 08/01/2014 11:00:31                    | 22.61     | 639          | 8.02    |
| 08/01/2014 11:15:31                    | 22.78     | 639          | 8.34    |
| 08/01/2014 11:30:31                    | 23.08     | 639          | 8.64    |
| 08/01/2014 11:45:31                    | 23.31     | 639          | 8.90    |
| 08/01/2014 12:00:31                    | 23.69     | 639          | 9.35    |
| 08/01/2014 12:15:31                    | 24.09     | 640          | 9.60    |
| 08/01/2014 12:30:31                    | 24.14     | 640          | 10.03   |
| 08/01/2014 12:45:31                    | 24.09     | 641          | 9.85    |
| 08/01/2014 13:00:32                    | 24.46     | 640          | 8.57    |
| 08/01/2014 13:15:31                    | 24.37     | 641          | 7.48    |
| 08/01/2014 13:30:31                    | 24.37     | 645          | 7.26    |
| 08/01/2014 13:45:31                    | 23.76     | 643          | 7.15    |
| 08/01/2014 14:00:31                    | 23.55     | 635          | 7.26    |
| 08/01/2014 14:15:31                    | 23.26     | 630          | 7.51    |
| 08/01/2014 14:30:31                    | 23.29     | 631          | 7.55    |
| 08/01/2014 14:45:32                    | 23.14     | 634          | 7.25    |
| 08/01/2014 15:00:32                    | 23.16     | 637          | 7.21    |
| 08/01/2014 15:15:32                    | 22.91     | 638          | 6.81    |
| 08/01/2014 15:30:32                    | 22.87     | 637          | 6.80    |
| 08/01/2014 15:45:31                    | 23.11     | 637          | 6.92    |
| 08/01/2014 16:00:31                    | 22.94     | 635          | 7.14    |
| 08/01/2014 16:15:32                    | 23.06     | 635          | 7.50    |
| 08/01/2014 16:30:32                    | 23.07     | 635          | 7.49    |
| 08/01/2014 16:45:32                    | 23.18     | 635          | 7.74    |
| 08/01/2014 17:00:32                    | 23.08     | 636          | 7.68    |
| 08/01/2014 17:15:31                    | 23.09     | 636          | 7.77    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/01/2014 17:30:32                    | 23.14     | 635          | 7.70    |
| 08/01/2014 17:45:32                    | 23.20     | 634          | 7.74    |
| 08/01/2014 18:00:31                    | 23.15     | 634          | 7.55    |
| 08/01/2014 18:15:31                    | 23.03     | 639          | 7.91    |
| 08/01/2014 18:30:31                    | 23.26     | 637          | 8.05    |
| 08/01/2014 18:45:31                    | 23.00     | 635          | 7.24    |
| 08/01/2014 19:00:32                    | 23.14     | 635          | 7.59    |
| 08/01/2014 19:15:31                    | 23.07     | 635          | 7.51    |
| 08/01/2014 19:30:31                    | 23.03     | 636          | 7.77    |
| 08/01/2014 19:45:32                    | 23.07     | 636          | 7.87    |
| 08/01/2014 20:00:31                    | 22.85     | 635          | 7.47    |
| 08/01/2014 20:15:32                    | 22.88     | 636          | 7.64    |
| 08/01/2014 20:30:32                    | 22.66     | 636          | 7.25    |
| 08/01/2014 20:45:31                    | 22.71     | 636          | 7.53    |
| 08/01/2014 21:00:31                    | 22.77     | 637          | 7.73    |
| 08/01/2014 21:15:32                    | 22.68     | 637          | 7.62    |
| 08/01/2014 21:30:31                    | 22.68     | 638          | 7.77    |
| 08/01/2014 21:45:31                    | 22.63     | 639          | 7.85    |
| 08/01/2014 22:00:32                    | 22.63     | 640          | 7.94    |
| 08/01/2014 22:15:31                    | 22.62     | 640          | 7.93    |
| 08/01/2014 22:30:31                    | 22.60     | 641          | 7.90    |
| 08/01/2014 22:45:31                    | 22.55     | 643          | 7.77    |
| 08/01/2014 23:00:31                    | 22.48     | 643          | 7.61    |
| 08/01/2014 23:15:32                    | 22.41     | 645          | 7.30    |
| 08/01/2014 23:30:31                    | 22.33     | 646          | 7.03    |
| 08/01/2014 23:45:31                    | 22.25     | 647          | 6.75    |
| 08/02/2014 00:00:31                    | 22.17     | 646          | 6.66    |
| 08/02/2014 00:15:31                    | 22.05     | 645          | 6.56    |
| 08/02/2014 00:30:31                    | 21.93     | 644          | 6.46    |
| 08/02/2014 00:45:31                    | 21.82     | 644          | 6.38    |
| 08/02/2014 01:00:31                    | 21.70     | 644          | 6.24    |
| 08/02/2014 01:15:31                    | 21.60     | 644          | 6.14    |
| 08/02/2014 01:30:32                    | 21.48     | 644          | 6.07    |
| 08/02/2014 01:45:31                    | 21.39     | 644          | 6.01    |
| 08/02/2014 02:00:31                    | 21.29     | 644          | 5.96    |
| 08/02/2014 02:15:31                    | 21.19     | 644          | 5.91    |
| 08/02/2014 02:30:31                    | 21.10     | 644          | 5.86    |
| 08/02/2014 02:45:31                    | 21.03     | 643          | 5.87    |
| 08/02/2014 03:00:32                    | 20.94     | 642          | 5.87    |
| 08/02/2014 03:15:31                    | 20.87     | 642          | 5.86    |
| 08/02/2014 03:30:31                    | 20.82     | 642          | 5.80    |
| 08/02/2014 03:45:32                    | 20.78     | 642          | 5.74    |
| 08/02/2014 04:00:32                    | 20.75     | 641          | 5.68    |
| 08/02/2014 04:15:32                    | 20.73     | 641          | 5.65    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/02/2014 04:30:32                    | 20.70     | 640          | 5.64    |
| 08/02/2014 04:45:32                    | 20.68     | 640          | 5.60    |
| 08/02/2014 05:00:31                    | 20.65     | 639          | 5.60    |
| 08/02/2014 05:15:32                    | 20.62     | 639          | 5.60    |
| 08/02/2014 05:30:31                    | 20.60     | 639          | 5.55    |
| 08/02/2014 05:45:31                    | 20.58     | 638          | 5.52    |
| 08/02/2014 06:00:31                    | 20.55     | 638          | 5.50    |
| 08/02/2014 06:15:32                    | 20.52     | 638          | 5.48    |
| 08/02/2014 06:30:31                    | 20.49     | 638          | 5.52    |
| 08/02/2014 06:45:31                    | 20.48     | 638          | 5.57    |
| 08/02/2014 07:00:32                    | 20.48     | 637          | 5.64    |
| 08/02/2014 07:15:32                    | 20.48     | 638          | 5.62    |
| 08/02/2014 07:30:32                    | 20.49     | 637          | 5.71    |
| 08/02/2014 07:45:32                    | 20.50     | 637          | 5.67    |
| 08/02/2014 08:00:32                    | 20.56     | 637          | 5.76    |
| 08/02/2014 08:15:32                    | 20.61     | 637          | 5.91    |
| 08/02/2014 08:30:32                    | 20.70     | 637          | 6.15    |
| 08/02/2014 08:45:32                    | 20.76     | 637          | 6.32    |
| 08/02/2014 09:00:32                    | 20.97     | 637          | 6.46    |
| 08/02/2014 09:15:31                    | 21.33     | 638          | 6.92    |
| 08/02/2014 09:30:31                    | 21.71     | 637          | 7.09    |
| 08/02/2014 09:45:31                    | 21.93     | 637          | 7.21    |
| 08/02/2014 10:00:31                    | 22.13     | 637          | 7.33    |
| 08/02/2014 10:15:31                    | 22.18     | 637          | 7.36    |
| 08/02/2014 10:30:31                    | 22.27     | 638          | 7.33    |
| 08/02/2014 10:45:31                    | 22.37     | 639          | 7.35    |
| 08/02/2014 11:00:31                    | 22.60     | 639          | 7.40    |
| 08/02/2014 11:15:31                    | 22.67     | 639          | 7.56    |
| 08/02/2014 11:30:32                    | 23.01     | 639          | 7.67    |
| 08/02/2014 11:45:31                    | 23.02     | 639          | 7.92    |
| 08/02/2014 12:00:31                    | 23.19     | 638          | 8.20    |
| 08/02/2014 12:15:31                    | 23.37     | 637          | 8.49    |
| 08/02/2014 12:30:31                    | 23.50     | 636          | 8.92    |
| 08/02/2014 12:45:31                    | 23.49     | 635          | 9.30    |
| 08/02/2014 13:00:31                    | 23.65     | 634          | 9.49    |
| 08/02/2014 13:15:31                    | 24.09     | 634          | 9.72    |
| 08/02/2014 13:30:31                    | 24.01     | 633          | 9.98    |
| 08/02/2014 13:45:31                    | 24.52     | 632          | 10.26   |
| 08/02/2014 14:00:31                    | 24.67     | 631          | 10.36   |
| 08/02/2014 14:15:31                    | 24.97     | 633          | 10.22   |
| 08/02/2014 14:30:31                    | 25.01     | 634          | 10.14   |
| 08/02/2014 14:45:31                    | 25.12     | 633          | 10.23   |
| 08/02/2014 15:00:31                    | 25.48     | 633          | 10.27   |
| 08/02/2014 15:15:31                    | 25.38     | 632          | 10.45   |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/02/2014 15:30:31                    | 25.57     | 629          | 10.62   |
| 08/02/2014 15:45:31                    | 25.65     | 629          | 10.62   |
| 08/02/2014 16:00:31                    | 25.80     | 630          | 10.52   |
| 08/02/2014 16:15:31                    | 25.82     | 629          | 10.65   |
| 08/02/2014 16:30:31                    | 25.81     | 629          | 10.37   |
| 08/02/2014 16:45:31                    | 25.84     | 630          | 10.35   |
| 08/02/2014 17:00:31                    | 26.16     | 628          | 10.63   |
| 08/02/2014 17:15:31                    | 25.51     | 631          | 10.40   |
| 08/02/2014 17:30:31                    | 26.01     | 629          | 10.65   |
| 08/02/2014 17:45:31                    | 26.19     | 627          | 10.65   |
| 08/02/2014 18:00:31                    | 26.14     | 628          | 10.56   |
| 08/02/2014 18:15:31                    | 25.98     | 628          | 10.54   |
| 08/02/2014 18:30:31                    | 25.94     | 627          | 10.44   |
| 08/02/2014 18:45:31                    | 26.02     | 627          | 10.39   |
| 08/02/2014 19:00:31                    | 25.74     | 627          | 9.60    |
| 08/02/2014 19:15:31                    | 25.52     | 625          | 8.93    |
| 08/02/2014 19:30:31                    | 25.63     | 626          | 9.24    |
| 08/02/2014 19:45:31                    | 25.42     | 627          | 8.99    |
| 08/02/2014 20:00:31                    | 25.21     | 628          | 9.06    |
| 08/02/2014 20:15:31                    | 24.87     | 627          | 8.21    |
| 08/02/2014 20:30:31                    | 24.68     | 627          | 8.08    |
| 08/02/2014 20:45:31                    | 24.56     | 626          | 8.01    |
| 08/02/2014 21:00:31                    | 24.26     | 627          | 7.87    |
| 08/02/2014 21:15:31                    | 24.14     | 627          | 7.85    |
| 08/02/2014 21:30:32                    | 24.09     | 626          | 7.83    |
| 08/02/2014 21:45:31                    | 23.93     | 627          | 7.80    |
| 08/02/2014 22:00:31                    | 23.84     | 627          | 7.78    |
| 08/02/2014 22:15:31                    | 23.68     | 627          | 7.70    |
| 08/02/2014 22:30:31                    | 23.58     | 627          | 7.70    |
| 08/02/2014 22:45:32                    | 23.46     | 627          | 7.68    |
| 08/02/2014 23:00:31                    | 23.33     | 627          | 7.65    |
| 08/02/2014 23:15:31                    | 23.29     | 627          | 7.56    |
| 08/02/2014 23:30:32                    | 23.12     | 629          | 7.49    |
| 08/02/2014 23:45:32                    | 23.09     | 628          | 7.51    |
| 08/03/2014 00:00:32                    | 22.89     | 629          | 7.31    |
| 08/03/2014 00:15:32                    | 22.80     | 630          | 7.35    |
| 08/03/2014 00:30:32                    | 22.71     | 630          | 7.27    |
| 08/03/2014 00:45:31                    | 22.65     | 631          | 7.34    |
| 08/03/2014 01:00:32                    | 22.54     | 631          | 7.15    |
| 08/03/2014 01:15:31                    | 22.45     | 632          | 7.09    |
| 08/03/2014 01:30:31                    | 22.34     | 632          | 7.02    |
| 08/03/2014 01:45:31                    | 22.29     | 632          | 6.98    |
| 08/03/2014 02:00:31                    | 22.13     | 633          | 6.89    |
| 08/03/2014 02:15:31                    | 22.02     | 633          | 6.82    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/03/2014 02:30:31                    | 22.09     | 633          | 7.12    |
| 08/03/2014 02:45:31                    | 21.97     | 632          | 6.81    |
| 08/03/2014 03:00:31                    | 21.82     | 633          | 6.68    |
| 08/03/2014 03:15:31                    | 21.81     | 633          | 6.69    |
| 08/03/2014 03:30:31                    | 21.70     | 634          | 6.66    |
| 08/03/2014 03:45:31                    | 21.64     | 634          | 6.57    |
| 08/03/2014 04:00:31                    | 21.57     | 634          | 6.49    |
| 08/03/2014 04:15:31                    | 21.49     | 635          | 6.47    |
| 08/03/2014 04:30:31                    | 21.46     | 635          | 6.41    |
| 08/03/2014 04:45:31                    | 21.40     | 635          | 6.35    |
| 08/03/2014 05:00:31                    | 21.29     | 635          | 6.31    |
| 08/03/2014 05:15:31                    | 21.22     | 635          | 6.25    |
| 08/03/2014 05:30:31                    | 21.18     | 635          | 6.17    |
| 08/03/2014 05:45:32                    | 21.16     | 635          | 6.13    |
| 08/03/2014 06:00:32                    | 20.99     | 636          | 6.04    |
| 08/03/2014 06:15:31                    | 20.92     | 637          | 6.02    |
| 08/03/2014 06:30:31                    | 20.86     | 637          | 6.01    |
| 08/03/2014 06:45:32                    | 20.77     | 637          | 5.93    |
| 08/03/2014 07:00:32                    | 20.81     | 637          | 6.02    |
| 08/03/2014 07:15:31                    | 20.81     | 637          | 6.09    |
| 08/03/2014 07:30:32                    | 20.79     | 637          | 6.04    |
| 08/03/2014 07:45:32                    | 20.94     | 637          | 6.20    |
| 08/03/2014 08:00:31                    | 20.89     | 636          | 6.19    |
| 08/03/2014 08:15:31                    | 21.17     | 635          | 6.35    |
| 08/03/2014 08:30:32                    | 21.15     | 633          | 6.48    |
| 08/03/2014 08:45:32                    | 21.23     | 633          | 6.46    |
| 08/03/2014 09:00:32                    | 21.35     | 633          | 6.44    |
| 08/03/2014 09:15:31                    | 21.52     | 634          | 6.31    |
| 08/03/2014 09:30:31                    | 21.75     | 636          | 6.22    |
| 08/03/2014 09:45:31                    | 22.11     | 638          | 6.52    |
| 08/03/2014 10:00:31                    | 22.33     | 638          | 6.75    |
| 08/03/2014 10:15:31                    | 22.37     | 636          | 7.12    |
| 08/03/2014 10:30:31                    | 22.41     | 636          | 7.27    |
| 08/03/2014 10:45:31                    | 22.58     | 636          | 7.62    |
| 08/03/2014 11:00:32                    | 22.71     | 636          | 7.89    |
| 08/03/2014 11:15:31                    | 22.90     | 636          | 8.24    |
| 08/03/2014 11:30:32                    | 23.11     | 638          | 8.30    |
| 08/03/2014 11:45:31                    | 23.49     | 638          | 8.65    |
| 08/03/2014 12:00:31                    | 23.75     | 638          | 8.43    |
| 08/03/2014 12:15:32                    | 24.22     | 637          | 8.65    |
| 08/03/2014 12:30:32                    | 24.69     | 637          | 8.88    |
| 08/03/2014 12:45:31                    | 25.11     | 639          | 8.68    |
| 08/03/2014 13:00:31                    | 24.90     | 638          | 9.20    |
| 08/03/2014 13:15:31                    | 24.79     | 641          | 9.03    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/03/2014 13:30:31                    | 25.00     | 637          | 9.57    |
| 08/03/2014 13:45:31                    | 25.19     | 636          | 9.97    |
| 08/03/2014 14:00:31                    | 25.37     | 637          | 10.00   |
| 08/03/2014 14:15:31                    | 25.34     | 635          | 10.10   |
| 08/03/2014 14:30:31                    | 25.38     | 634          | 10.11   |
| 08/03/2014 14:45:32                    | 25.44     | 635          | 10.18   |
| 08/03/2014 15:00:31                    | 25.46     | 632          | 9.69    |
| 08/03/2014 15:15:31                    | 25.45     | 632          | 10.05   |
| 08/03/2014 15:30:31                    | 25.64     | 633          | 10.14   |
| 08/03/2014 15:45:31                    | 25.40     | 630          | 9.57    |
| 08/03/2014 16:00:31                    | 25.58     | 629          | 9.98    |
| 08/03/2014 16:15:31                    | 25.71     | 629          | 10.08   |
| 08/03/2014 16:30:31                    | 25.69     | 628          | 10.06   |
| 08/03/2014 16:45:31                    | 25.81     | 627          | 10.30   |
| 08/03/2014 17:00:31                    | 25.68     | 628          | 10.30   |
| 08/03/2014 17:15:31                    | 25.69     | 627          | 10.04   |
| 08/03/2014 17:30:31                    | 25.63     | 627          | 9.76    |
| 08/03/2014 17:45:31                    | 25.60     | 628          | 9.78    |
| 08/03/2014 18:00:31                    | 25.60     | 627          | 9.44    |
| 08/03/2014 18:15:31                    | 25.75     | 629          | 9.86    |
| 08/03/2014 18:30:31                    | 25.43     | 630          | 9.55    |
| 08/03/2014 18:45:31                    | 25.33     | 629          | 9.11    |
| 08/03/2014 19:00:31                    | 25.31     | 629          | 8.89    |
| 08/03/2014 19:15:31                    | 25.31     | 627          | 8.67    |
| 08/03/2014 19:30:31                    | 25.21     | 627          | 8.30    |
| 08/03/2014 19:45:31                    | 25.06     | 628          | 8.09    |
| 08/03/2014 20:00:31                    | 25.06     | 627          | 7.85    |
| 08/03/2014 20:15:31                    | 24.83     | 628          | 7.48    |
| 08/03/2014 20:30:31                    | 24.70     | 627          | 7.56    |
| 08/03/2014 20:45:32                    | 24.58     | 627          | 7.48    |
| 08/03/2014 21:00:31                    | 24.50     | 627          | 7.37    |
| 08/03/2014 21:15:32                    | 24.27     | 628          | 7.25    |
| 08/03/2014 21:30:31                    | 24.28     | 626          | 7.16    |
| 08/03/2014 21:45:31                    | 24.20     | 626          | 7.26    |
| 08/03/2014 22:00:31                    | 23.86     | 628          | 6.89    |
| 08/03/2014 22:15:32                    | 23.99     | 626          | 7.13    |
| 08/03/2014 22:30:32                    | 23.79     | 626          | 6.85    |
| 08/03/2014 22:45:31                    | 23.67     | 627          | 7.30    |
| 08/03/2014 23:00:31                    | 23.47     | 627          | 6.69    |
| 08/03/2014 23:15:31                    | 23.26     | 627          | 6.49    |
| 08/03/2014 23:30:31                    | 23.34     | 626          | 6.82    |
| 08/03/2014 23:45:32                    | 23.34     | 626          | 6.93    |
| 08/04/2014 00:00:31                    | 23.23     | 627          | 6.75    |
| 08/04/2014 00:15:31                    | 23.13     | 628          | 6.70    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/04/2014 00:30:32                    | 23.10     | 629          | 6.80    |
| 08/04/2014 00:45:31                    | 22.97     | 629          | 6.79    |
| 08/04/2014 01:00:32                    | 22.99     | 629          | 6.62    |
| 08/04/2014 01:15:31                    | 22.90     | 630          | 6.80    |
| 08/04/2014 01:30:32                    | 22.80     | 630          | 6.58    |
| 08/04/2014 01:45:32                    | 22.72     | 631          | 6.57    |
| 08/04/2014 02:00:32                    | 22.57     | 631          | 6.24    |
| 08/04/2014 02:15:32                    | 22.54     | 631          | 6.46    |
| 08/04/2014 02:30:31                    | 22.41     | 632          | 6.34    |
| 08/04/2014 02:45:31                    | 22.29     | 633          | 6.39    |
| 08/04/2014 03:00:31                    | 22.40     | 632          | 6.27    |
| 08/04/2014 03:15:31                    | 22.33     | 632          | 6.20    |
| 08/04/2014 03:30:31                    | 22.26     | 632          | 6.34    |
| 08/04/2014 03:45:31                    | 22.15     | 632          | 6.32    |
| 08/04/2014 04:00:31                    | 22.09     | 633          | 6.54    |
| 08/04/2014 04:15:31                    | 22.01     | 633          | 6.55    |
| 08/04/2014 04:30:31                    | 21.97     | 632          | 6.50    |
| 08/04/2014 04:45:31                    | 21.91     | 633          | 6.57    |
| 08/04/2014 05:00:31                    | 21.88     | 633          | 6.47    |
| 08/04/2014 05:15:31                    | 21.85     | 633          | 6.54    |
| 08/04/2014 05:30:31                    | 21.74     | 633          | 6.40    |
| 08/04/2014 05:45:31                    | 21.71     | 633          | 6.38    |
| 08/04/2014 06:00:31                    | 21.64     | 633          | 6.30    |
| 08/04/2014 06:15:31                    | 21.58     | 633          | 6.22    |
| 08/04/2014 06:30:31                    | 21.53     | 633          | 6.01    |
| 08/04/2014 06:45:31                    | 21.52     | 634          | 6.28    |
| 08/04/2014 07:00:31                    | 21.52     | 633          | 5.99    |
| 08/04/2014 07:15:32                    | 21.52     | 633          | 6.11    |
| 08/04/2014 07:30:31                    | 21.59     | 633          | 6.27    |
| 08/04/2014 07:45:31                    | 21.62     | 634          | 6.39    |
| 08/04/2014 08:00:31                    | 21.77     | 634          | 6.36    |
| 08/04/2014 08:15:31                    | 21.83     | 633          | 6.32    |
| 08/04/2014 08:30:31                    | 21.92     | 633          | 6.23    |
| 08/04/2014 08:45:31                    | 22.04     | 633          | 6.27    |
| 08/04/2014 09:00:31                    | 22.15     | 633          | 6.31    |
| 08/04/2014 09:15:31                    | 22.30     | 635          | 6.50    |
| 08/04/2014 09:30:31                    | 22.39     | 637          | 6.52    |
| 08/04/2014 09:45:32                    | 22.58     | 636          | 6.41    |
| 08/04/2014 10:00:31                    | 22.81     | 636          | 7.00    |
| 08/04/2014 10:15:32                    | 23.02     | 634          | 7.34    |
| 08/04/2014 10:30:31                    | 23.04     | 634          | 7.55    |
| 08/04/2014 10:45:31                    | 22.99     | 634          | 7.48    |
| 08/04/2014 11:00:32                    | 23.21     | 633          | 7.91    |
| 08/04/2014 11:15:31                    | 23.50     | 633          | 8.39    |



| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/04/2014 11:30:31                    | 23.65     | 633          | 8.74    |
| 08/04/2014 11:45:31                    | 23.85     | 632          | 8.88    |
| 08/04/2014 12:00:31                    | 23.97     | 633          | 9.06    |
| 08/04/2014 12:15:31                    | 24.23     | 634          | 9.44    |
| 08/04/2014 12:30:31                    | 24.57     | 633          | 9.50    |
| 08/04/2014 12:45:32                    | 24.62     | 634          | 9.80    |
| 08/04/2014 13:00:31                    | 24.85     | 633          | 9.78    |
| 08/04/2014 13:15:31                    | 25.20     | 633          | 10.33   |
| 08/04/2014 13:30:31                    | 25.53     | 633          | 10.16   |
| 08/04/2014 13:45:31                    | 25.50     | 633          | 9.67    |
| 08/04/2014 14:00:31                    | 25.44     | 633          | 9.42    |
| 08/04/2014 14:15:31                    | 25.51     | 633          | 9.24    |
| 08/04/2014 14:30:31                    | 25.75     | 633          | 9.28    |
| 08/04/2014 14:45:31                    | 25.82     | 634          | 9.21    |
| 08/04/2014 15:00:32                    | 25.97     | 635          | 9.41    |
| 08/04/2014 15:15:31                    | 26.06     | 634          | 9.23    |
| 08/04/2014 15:30:32                    | 26.22     | 633          | 9.35    |
| 08/04/2014 15:45:31                    | 26.11     | 633          | 9.33    |
| 08/04/2014 16:00:31                    | 26.29     | 632          | 9.70    |
| 08/04/2014 16:15:31                    | 26.28     | 630          | 9.49    |
| 08/04/2014 16:30:31                    | 26.18     | 630          | 9.36    |
| 08/04/2014 16:45:31                    | 26.26     | 630          | 9.62    |
| 08/04/2014 17:00:31                    | 26.13     | 631          | 9.15    |
| 08/04/2014 17:15:31                    | 26.09     | 631          | 9.25    |
| 08/04/2014 17:30:31                    | 26.14     | 629          | 9.15    |
| 08/04/2014 17:45:31                    | 25.91     | 630          | 9.06    |
| 08/04/2014 18:00:31                    | 25.92     | 630          | 8.74    |
| 08/04/2014 18:15:31                    | 25.86     | 630          | 8.48    |
| 08/04/2014 18:30:32                    | 25.82     | 630          | 8.25    |
| 08/04/2014 18:45:31                    | 25.78     | 630          | 7.89    |
| 08/04/2014 19:00:32                    | 25.80     | 630          | 7.83    |
| 08/04/2014 19:15:31                    | 25.69     | 630          | 7.91    |
| 08/04/2014 19:30:31                    | 25.48     | 630          | 7.53    |
| 08/04/2014 19:45:31                    | 25.51     | 629          | 7.63    |
| 08/04/2014 20:00:32                    | 25.37     | 629          | 7.01    |
| 08/04/2014 20:15:31                    | 25.33     | 627          | 7.08    |
| 08/04/2014 20:30:31                    | 25.03     | 627          | 6.80    |
| 08/04/2014 20:45:31                    | 24.84     | 627          | 6.66    |
| 08/04/2014 21:00:31                    | 24.79     | 626          | 6.59    |
| 08/04/2014 21:15:32                    | 24.67     | 626          | 6.92    |
| 08/04/2014 21:30:31                    | 24.65     | 625          | 6.83    |
| 08/04/2014 21:45:31                    | 24.53     | 625          | 6.73    |
| 08/04/2014 22:00:31                    | 24.37     | 625          | 6.59    |
| 08/04/2014 22:15:31                    | 24.32     | 625          | 6.60    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/04/2014 22:30:32                    | 24.20     | 624          | 6.55    |
| 08/04/2014 22:45:31                    | 24.04     | 625          | 6.37    |
| 08/04/2014 23:00:31                    | 23.98     | 625          | 6.54    |
| 08/04/2014 23:15:31                    | 23.92     | 625          | 6.19    |
| 08/04/2014 23:30:32                    | 23.87     | 625          | 6.17    |
| 08/04/2014 23:45:32                    | 23.76     | 626          | 6.28    |
| 08/05/2014 00:00:31                    | 23.57     | 627          | 6.16    |
| 08/05/2014 00:15:31                    | 23.56     | 626          | 6.12    |
| 08/05/2014 00:30:31                    | 23.72     | 627          | 6.92    |
| 08/05/2014 00:45:31                    | 23.44     | 617          | 7.23    |
| 08/05/2014 01:00:32                    | 23.33     | 611          | 6.36    |
| 08/05/2014 01:15:32                    | 23.32     | 615          | 6.59    |
| 08/05/2014 01:30:32                    | 23.36     | 618          | 6.21    |
| 08/05/2014 01:45:32                    | 23.25     | 620          | 5.84    |
| 08/05/2014 02:00:32                    | 23.26     | 621          | 5.62    |
| 08/05/2014 02:15:32                    | 23.28     | 623          | 6.03    |
| 08/05/2014 02:30:32                    | 23.35     | 621          | 6.18    |
| 08/05/2014 02:45:32                    | 23.24     | 622          | 5.68    |
| 08/05/2014 03:00:31                    | 23.26     | 624          | 6.01    |
| 08/05/2014 03:15:32                    | 23.35     | 624          | 5.79    |
| 08/05/2014 03:30:32                    | 23.47     | 621          | 6.89    |
| 08/05/2014 03:45:32                    | 23.26     | 601          | 7.18    |
| 08/05/2014 04:00:32                    | 23.01     | 586          | 6.51    |
| 08/05/2014 04:15:32                    | 22.97     | 587          | 6.25    |
| 08/05/2014 04:30:32                    | 23.16     | 597          | 6.13    |
| 08/05/2014 04:45:31                    | 23.01     | 604          | 6.06    |
| 08/05/2014 05:00:31                    | 23.21     | 590          | 7.15    |
| 08/05/2014 05:15:32                    | 23.28     | 603          | 7.03    |
| 08/05/2014 05:30:32                    | 23.18     | 602          | 6.70    |
| 08/05/2014 05:45:31                    | 23.31     | 615          | 6.78    |
| 08/05/2014 06:00:32                    | 23.35     | 620          | 6.80    |
| 08/05/2014 06:15:32                    | 23.26     | 622          | 6.57    |
| 08/05/2014 06:30:32                    | 23.29     | 624          | 6.54    |
| 08/05/2014 06:45:32                    | 23.27     | 626          | 6.46    |
| 08/05/2014 07:00:31                    | 23.23     | 627          | 6.45    |
| 08/05/2014 07:15:31                    | 23.26     | 628          | 6.43    |
| 08/05/2014 07:30:31                    | 23.29     | 628          | 6.44    |
| 08/05/2014 07:45:31                    | 23.33     | 628          | 6.51    |
| 08/05/2014 08:00:31                    | 23.35     | 627          | 6.53    |
| 08/05/2014 08:15:31                    | 23.36     | 626          | 6.59    |
| 08/05/2014 08:30:31                    | 23.43     | 625          | 6.77    |
| 08/05/2014 08:45:31                    | 23.65     | 624          | 7.12    |
| 08/05/2014 09:00:31                    | 23.88     | 623          | 7.55    |
| 08/05/2014 09:15:31                    | 23.66     | 621          | 7.20    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/05/2014 09:30:32                    | 23.76     | 623          | 7.11    |
| 08/05/2014 09:45:32                    | 24.28     | 621          | 7.92    |
| 08/05/2014 10:00:31                    | 24.40     | 622          | 8.04    |
| 08/05/2014 10:15:31                    | 24.77     | 620          | 8.25    |
| 08/05/2014 10:30:32                    | 24.68     | 620          | 8.01    |
| 08/05/2014 10:45:31                    | 24.71     | 621          | 7.82    |
| 08/05/2014 11:00:31                    | 24.65     | 622          | 7.70    |
| 08/05/2014 11:15:31                    | 24.57     | 622          | 7.55    |
| 08/05/2014 11:30:31                    | 24.57     | 623          | 7.91    |
| 08/05/2014 11:45:31                    | 24.77     | 624          | 8.55    |
| 08/05/2014 12:00:32                    | 24.98     | 624          | 9.17    |
| 08/05/2014 12:15:31                    | 25.05     | 624          | 9.68    |
| 08/05/2014 12:30:31                    | 25.02     | 623          | 9.94    |
| 08/05/2014 12:45:31                    | 25.25     | 623          | 10.23   |
| 08/05/2014 13:00:31                    | 25.50     | 623          | 10.40   |
| 08/05/2014 13:15:31                    | 25.75     | 624          | 10.48   |
| 08/05/2014 13:30:31                    | 25.99     | 624          | 10.46   |
| 08/05/2014 13:45:31                    | 26.08     | 624          | 10.38   |
| 08/05/2014 14:00:31                    | 26.22     | 624          | 10.29   |
| 08/05/2014 14:15:31                    | 26.38     | 623          | 10.42   |
| 08/05/2014 14:30:31                    | 26.36     | 621          | 10.32   |
| 08/05/2014 14:45:31                    | 26.13     | 620          | 10.18   |
| 08/05/2014 15:00:31                    | 26.10     | 619          | 10.23   |
| 08/05/2014 15:15:31                    | 26.34     | 618          | 10.54   |
| 08/05/2014 15:30:31                    | 26.43     | 615          | 10.71   |
| 08/05/2014 15:45:31                    | 26.48     | 614          | 10.50   |
| 08/05/2014 16:00:31                    | 26.30     | 614          | 10.16   |
| 08/05/2014 16:15:31                    | 26.20     | 614          | 9.93    |
| 08/05/2014 16:30:32                    | 26.21     | 614          | 9.86    |
| 08/05/2014 16:45:31                    | 26.24     | 614          | 9.92    |
| 08/05/2014 17:00:31                    | 26.36     | 613          | 10.08   |
| 08/05/2014 17:15:32                    | 26.38     | 613          | 10.13   |
| 08/05/2014 17:30:31                    | 26.51     | 613          | 10.16   |
| 08/05/2014 17:45:31                    | 26.56     | 613          | 10.07   |
| 08/05/2014 18:00:31                    | 26.53     | 614          | 9.72    |
| 08/05/2014 18:15:31                    | 26.49     | 615          | 9.47    |
| 08/05/2014 18:30:31                    | 26.45     | 615          | 9.32    |
| 08/05/2014 18:45:31                    | 26.44     | 615          | 9.17    |
| 08/05/2014 19:00:31                    | 26.45     | 616          | 9.19    |
| 08/05/2014 19:15:31                    | 26.42     | 617          | 9.11    |
| 08/05/2014 19:30:31                    | 26.37     | 617          | 9.03    |
| 08/05/2014 19:45:31                    | 26.26     | 617          | 8.91    |
| 08/05/2014 20:00:31                    | 26.15     | 618          | 8.84    |
| 08/05/2014 20:15:32                    | 26.05     | 618          | 8.70    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/05/2014 20:30:31                    | 25.95     | 619          | 8.50    |
| 08/05/2014 20:45:31                    | 25.85     | 620          | 8.33    |
| 08/05/2014 21:00:31                    | 25.76     | 620          | 8.22    |
| 08/05/2014 21:15:31                    | 25.67     | 621          | 8.01    |
| 08/05/2014 21:30:31                    | 25.58     | 622          | 7.89    |
| 08/05/2014 21:45:31                    | 25.50     | 623          | 7.80    |
| 08/05/2014 22:00:31                    | 25.40     | 623          | 7.74    |
| 08/05/2014 22:15:31                    | 25.31     | 623          | 7.65    |
| 08/05/2014 22:30:31                    | 25.23     | 623          | 7.62    |
| 08/05/2014 22:45:31                    | 25.15     | 624          | 7.53    |
| 08/05/2014 23:00:32                    | 25.07     | 625          | 7.29    |
| 08/05/2014 23:15:31                    | 24.99     | 625          | 7.19    |
| 08/05/2014 23:30:31                    | 24.92     | 626          | 7.12    |
| 08/05/2014 23:45:31                    | 24.84     | 626          | 7.05    |
| 08/06/2014 00:00:31                    | 24.77     | 627          | 6.94    |
| 08/06/2014 00:15:32                    | 24.70     | 628          | 6.76    |
| 08/06/2014 00:30:32                    | 24.63     | 628          | 6.66    |
| 08/06/2014 00:45:31                    | 24.56     | 628          | 6.68    |
| 08/06/2014 01:00:31                    | 24.49     | 629          | 6.57    |
| 08/06/2014 01:15:31                    | 24.43     | 629          | 6.44    |
| 08/06/2014 01:30:31                    | 24.36     | 630          | 6.36    |
| 08/06/2014 01:45:31                    | 24.29     | 630          | 6.34    |
| 08/06/2014 02:00:31                    | 24.23     | 631          | 6.24    |
| 08/06/2014 02:15:31                    | 24.17     | 631          | 6.17    |
| 08/06/2014 02:30:32                    | 24.13     | 631          | 6.08    |
| 08/06/2014 02:45:31                    | 24.07     | 631          | 6.01    |
| 08/06/2014 03:00:31                    | 24.02     | 631          | 5.98    |
| 08/06/2014 03:15:32                    | 23.97     | 631          | 5.94    |
| 08/06/2014 03:30:31                    | 23.92     | 631          | 5.88    |
| 08/06/2014 03:45:31                    | 23.88     | 631          | 5.84    |
| 08/06/2014 04:00:32                    | 23.83     | 632          | 5.74    |
| 08/06/2014 04:15:31                    | 23.78     | 633          | 5.63    |
| 08/06/2014 04:30:31                    | 23.72     | 634          | 5.55    |
| 08/06/2014 04:45:32                    | 23.68     | 634          | 5.48    |
| 08/06/2014 05:00:32                    | 23.63     | 635          | 5.41    |
| 08/06/2014 05:15:32                    | 23.58     | 635          | 5.37    |
| 08/06/2014 05:30:32                    | 23.52     | 635          | 5.34    |
| 08/06/2014 05:45:31                    | 23.48     | 635          | 5.27    |
| 08/06/2014 06:00:31                    | 23.43     | 635          | 5.23    |
| 08/06/2014 06:15:31                    | 23.39     | 635          | 5.19    |
| 08/06/2014 06:30:32                    | 23.38     | 635          | 5.15    |
| 08/06/2014 06:45:32                    | 23.40     | 635          | 5.24    |
| 08/06/2014 07:00:32                    | 23.45     | 635          | 5.39    |
| 08/06/2014 07:15:32                    | 23.50     | 635          | 5.50    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/06/2014 07:30:32                    | 23.53     | 635          | 5.65    |
| 08/06/2014 07:45:32                    | 23.57     | 635          | 5.79    |
| 08/06/2014 08:00:32                    | 23.61     | 634          | 6.05    |
| 08/06/2014 08:15:32                    | 23.63     | 635          | 6.05    |
| 08/06/2014 08:30:31                    | 23.68     | 635          | 6.18    |
| 08/06/2014 08:45:31                    | 23.81     | 635          | 6.50    |
| 08/06/2014 09:00:32                    | 23.69     | 636          | 6.13    |
| 08/06/2014 09:15:32                    | 23.72     | 636          | 6.32    |
| 08/06/2014 09:30:32                    | 23.75     | 636          | 6.36    |
| 08/06/2014 09:45:32                    | 23.78     | 636          | 6.44    |
| 08/06/2014 10:00:32                    | 23.89     | 636          | 6.68    |
| 08/06/2014 10:15:32                    | 24.03     | 636          | 7.15    |
| 08/06/2014 10:30:32                    | 24.14     | 634          | 7.39    |
| 08/06/2014 10:45:32                    | 24.11     | 633          | 7.76    |
| 08/06/2014 11:00:31                    | 24.32     | 631          | 7.88    |
| 08/06/2014 11:15:31                    | 24.61     | 633          | 8.73    |
| 08/06/2014 11:30:31                    | 24.70     | 633          | 8.76    |
| 08/06/2014 11:45:31                    | 24.62     | 634          | 8.60    |
| 08/06/2014 12:00:32                    | 25.05     | 634          | 8.96    |
| 08/06/2014 12:15:31                    | 25.14     | 634          | 9.18    |
| 08/06/2014 12:30:31                    | 25.28     | 634          | 9.63    |
| 08/06/2014 12:45:31                    | 25.38     | 633          | 9.64    |
| 08/06/2014 13:00:31                    | 25.39     | 633          | 9.93    |
| 08/06/2014 13:15:31                    | 25.50     | 632          | 10.28   |
| 08/06/2014 13:30:31                    | 25.79     | 631          | 10.74   |
| 08/06/2014 13:45:31                    | 26.04     | 631          | 10.97   |
| 08/06/2014 14:00:31                    | 26.06     | 631          | 10.99   |
| 08/06/2014 14:15:32                    | 26.15     | 630          | 10.93   |
| 08/06/2014 14:30:31                    | 26.27     | 630          | 11.18   |
| 08/06/2014 14:45:31                    | 26.46     | 629          | 11.55   |
| 08/06/2014 15:00:31                    | 26.57     | 627          | 11.59   |
| 08/06/2014 15:15:31                    | 26.68     | 628          | 11.84   |
| 08/06/2014 15:30:31                    | 26.90     | 627          | 11.98   |
| 08/06/2014 15:45:31                    | 26.98     | 627          | 12.01   |
| 08/06/2014 16:00:31                    | 26.88     | 627          | 11.83   |
| 08/06/2014 16:15:31                    | 27.01     | 626          | 11.94   |
| 08/06/2014 16:30:31                    | 26.96     | 625          | 11.78   |
| 08/06/2014 16:45:31                    | 26.91     | 624          | 11.53   |
| 08/06/2014 17:00:31                    | 26.92     | 623          | 11.59   |
| 08/06/2014 17:15:31                    | 26.83     | 622          | 11.13   |
| 08/06/2014 17:30:31                    | 26.67     | 622          | 10.83   |
| 08/06/2014 17:45:31                    | 26.77     | 621          | 10.95   |
| 08/06/2014 18:00:31                    | 26.65     | 621          | 10.64   |
| 08/06/2014 18:15:31                    | 26.54     | 621          | 10.28   |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/06/2014 18:30:31                    | 26.39     | 622          | 9.65    |
| 08/06/2014 18:45:31                    | 26.32     | 624          | 9.67    |
| 08/06/2014 19:00:31                    | 26.22     | 623          | 9.11    |
| 08/06/2014 19:15:31                    | 26.06     | 623          | 8.79    |
| 08/06/2014 19:30:31                    | 25.99     | 622          | 8.34    |
| 08/06/2014 19:45:31                    | 25.96     | 623          | 8.73    |
| 08/06/2014 20:00:31                    | 25.75     | 622          | 8.67    |
| 08/06/2014 20:15:31                    | 25.77     | 622          | 8.75    |
| 08/06/2014 20:30:31                    | 25.53     | 622          | 8.36    |
| 08/06/2014 20:45:31                    | 25.37     | 623          | 8.38    |
| 08/06/2014 21:00:31                    | 25.40     | 622          | 8.43    |
| 08/06/2014 21:15:31                    | 25.20     | 622          | 8.08    |
| 08/06/2014 21:30:31                    | 25.20     | 623          | 8.08    |
| 08/06/2014 21:45:31                    | 25.10     | 623          | 8.16    |
| 08/06/2014 22:00:31                    | 25.07     | 623          | 8.04    |
| 08/06/2014 22:15:31                    | 24.96     | 624          | 7.60    |
| 08/06/2014 22:30:31                    | 24.84     | 632          | 7.51    |
| 08/06/2014 22:45:31                    | 24.73     | 626          | 7.33    |
| 08/06/2014 23:00:31                    | 24.96     | 625          | 7.76    |
| 08/06/2014 23:15:32                    | 24.78     | 626          | 7.43    |
| 08/06/2014 23:30:31                    | 24.76     | 626          | 7.62    |
| 08/06/2014 23:45:32                    | 24.57     | 626          | 7.15    |
| 08/07/2014 00:00:31                    | 24.65     | 627          | 7.35    |
| 08/07/2014 00:15:31                    | 24.73     | 626          | 7.47    |
| 08/07/2014 00:30:31                    | 24.68     | 625          | 7.08    |
| 08/07/2014 00:45:31                    | 24.46     | 627          | 7.09    |
| 08/07/2014 01:00:31                    | 24.47     | 626          | 6.80    |
| 08/07/2014 01:15:31                    | 24.41     | 626          | 6.79    |
| 08/07/2014 01:30:32                    | 24.39     | 627          | 6.75    |
| 08/07/2014 01:45:31                    | 24.32     | 627          | 6.69    |
| 08/07/2014 02:00:32                    | 24.17     | 627          | 6.34    |
| 08/07/2014 02:15:31                    | 24.28     | 628          | 6.54    |
| 08/07/2014 02:30:32                    | 24.29     | 628          | 6.55    |
| 08/07/2014 02:45:32                    | 24.23     | 629          | 6.68    |
| 08/07/2014 03:00:32                    | 24.23     | 628          | 6.47    |
| 08/07/2014 03:15:32                    | 24.29     | 628          | 6.74    |
| 08/07/2014 03:30:32                    | 24.02     | 629          | 6.39    |
| 08/07/2014 03:45:32                    | 24.00     | 628          | 6.33    |
| 08/07/2014 04:00:32                    | 24.11     | 631          | 6.46    |
| 08/07/2014 04:15:32                    | 24.00     | 630          | 6.27    |
| 08/07/2014 04:30:31                    | 24.15     | 630          | 6.24    |
| 08/07/2014 04:45:31                    | 23.87     | 631          | 5.95    |
| 08/07/2014 05:00:32                    | 23.98     | 631          | 5.81    |
| 08/07/2014 05:15:31                    | 23.77     | 630          | 5.70    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/07/2014 05:30:31                    | 23.74     | 630          | 5.69    |
| 08/07/2014 05:45:32                    | 23.70     | 631          | 5.62    |
| 08/07/2014 06:00:32                    | 23.66     | 631          | 5.39    |
| 08/07/2014 06:15:31                    | 23.62     | 631          | 5.25    |
| 08/07/2014 06:30:32                    | 23.60     | 631          | 5.37    |
| 08/07/2014 06:45:32                    | 23.48     | 632          | 5.15    |
| 08/07/2014 07:00:32                    | 23.45     | 631          | 5.06    |
| 08/07/2014 07:15:31                    | 23.77     | 624          | 5.85    |
| 08/07/2014 07:30:31                    | 23.42     | 557          | 7.17    |
| 08/07/2014 07:45:32                    | 23.52     | 568          | 6.84    |
| 08/07/2014 08:00:32                    | 23.48     | 564          | 6.95    |
| 08/07/2014 08:15:32                    | 23.54     | 580          | 6.52    |
| 08/07/2014 08:30:31                    | 23.58     | 595          | 6.24    |
| 08/07/2014 08:45:32                    | 23.59     | 605          | 5.94    |
| 08/07/2014 09:00:32                    | 23.55     | 612          | 5.71    |
| 08/07/2014 09:15:32                    | 23.39     | 601          | 5.72    |
| 08/07/2014 09:30:32                    | 23.13     | 578          | 6.37    |
| 08/07/2014 09:45:31                    | 22.98     | 567          | 6.41    |
| 08/07/2014 10:00:32                    | 23.12     | 555          | 6.70    |
| 08/07/2014 10:15:32                    | 23.28     | 545          | 6.85    |
| 08/07/2014 10:30:32                    | 23.49     | 517          | 7.12    |
| 08/07/2014 10:45:32                    | 23.32     | 443          | 7.53    |
| 08/07/2014 11:00:31                    | 23.26     | 422          | 7.53    |
| 08/07/2014 11:15:31                    | 23.11     | 405          | 7.59    |
| 08/07/2014 11:30:31                    | 23.20     | 388          | 7.66    |
| 08/07/2014 11:45:32                    | 23.35     | 355          | 7.78    |
| 08/07/2014 12:00:32                    | 23.47     | 338          | 7.87    |
| 08/07/2014 12:15:32                    | 23.55     | 329          | 7.87    |
| 08/07/2014 12:30:32                    | 23.37     | 318          | 7.93    |
| 08/07/2014 12:45:31                    | 23.35     | 295          | 8.00    |
| 08/07/2014 13:00:32                    | 23.44     | 295          | 7.96    |
| 08/07/2014 13:15:32                    | 23.57     | 304          | 7.90    |
| 08/07/2014 13:30:32                    | 23.61     | 310          | 7.85    |
| 08/07/2014 13:45:32                    | 23.66     | 317          | 7.78    |
| 08/07/2014 14:00:31                    | 23.70     | 320          | 7.76    |
| 08/07/2014 14:15:31                    | 23.74     | 324          | 7.75    |
| 08/07/2014 14:30:31                    | 23.75     | 327          | 7.73    |
| 08/07/2014 14:45:31                    | 23.74     | 329          | 7.70    |
| 08/07/2014 15:00:32                    | 23.73     | 331          | 7.66    |
| 08/07/2014 15:15:32                    | 23.73     | 333          | 7.63    |
| 08/07/2014 15:30:32                    | 23.73     | 335          | 7.60    |
| 08/07/2014 15:45:32                    | 23.75     | 338          | 7.57    |
| 08/07/2014 16:00:32                    | 23.77     | 340          | 7.55    |
| 08/07/2014 16:15:32                    | 23.76     | 342          | 7.51    |

| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/07/2014 16:30:31                    | 23.77     | 343          | 7.50    |
| 08/07/2014 16:45:31                    | 23.76     | 344          | 7.48    |
| 08/07/2014 17:00:32                    | 23.61     | 342          | 7.45    |
| 08/07/2014 17:15:32                    | 23.38     | 335          | 7.37    |
| 08/07/2014 17:30:31                    | 23.36     | 335          | 7.29    |
| 08/07/2014 17:45:31                    | 23.42     | 344          | 7.21    |
| 08/07/2014 18:00:31                    | 23.48     | 354          | 7.19    |
| 08/07/2014 18:15:31                    | 23.51     | 363          | 7.24    |
| 08/07/2014 18:30:32                    | 23.56     | 372          | 7.28    |
| 08/07/2014 18:45:32                    | 23.61     | 384          | 7.34    |
| 08/07/2014 19:00:32                    | 23.63     | 392          | 7.39    |
| 08/07/2014 19:15:32                    | 23.64     | 395          | 7.40    |
| 08/07/2014 19:30:32                    | 23.63     | 395          | 7.39    |
| 08/07/2014 19:45:32                    | 23.62     | 392          | 7.38    |
| 08/07/2014 20:00:32                    | 23.61     | 389          | 7.36    |
| 08/07/2014 20:15:31                    | 23.60     | 386          | 7.34    |
| 08/07/2014 20:30:31                    | 23.58     | 385          | 7.32    |
| 08/07/2014 20:45:31                    | 23.55     | 384          | 7.32    |
| 08/07/2014 21:00:31                    | 23.53     | 385          | 7.30    |
| 08/07/2014 21:15:32                    | 23.52     | 386          | 7.29    |
| 08/07/2014 21:30:32                    | 23.51     | 388          | 7.30    |
| 08/07/2014 21:45:32                    | 23.48     | 391          | 7.29    |
| 08/07/2014 22:00:32                    | 23.46     | 394          | 7.30    |
| 08/07/2014 22:15:32                    | 23.42     | 398          | 7.28    |
| 08/07/2014 22:30:32                    | 23.39     | 402          | 7.26    |
| 08/07/2014 22:45:32                    | 23.36     | 406          | 7.27    |
| 08/07/2014 23:00:32                    | 23.32     | 410          | 7.26    |
| 08/07/2014 23:15:31                    | 23.29     | 414          | 7.25    |
| 08/07/2014 23:30:32                    | 23.26     | 418          | 7.24    |
| 08/07/2014 23:45:32                    | 23.23     | 422          | 7.25    |
| 08/08/2014 00:00:32                    | 23.20     | 426          | 7.24    |
| 08/08/2014 00:15:32                    | 23.18     | 430          | 7.23    |
| 08/08/2014 00:30:31                    | 23.15     | 433          | 7.22    |
| 08/08/2014 00:45:32                    | 23.13     | 436          | 7.21    |
| 08/08/2014 01:00:32                    | 23.10     | 438          | 7.20    |
| 08/08/2014 01:15:32                    | 23.08     | 439          | 7.20    |
| 08/08/2014 01:30:32                    | 23.07     | 438          | 7.18    |
| 08/08/2014 01:45:31                    | 23.05     | 437          | 7.16    |
| 08/08/2014 02:00:32                    | 23.03     | 436          | 7.14    |
| 08/08/2014 02:15:31                    | 23.01     | 433          | 7.13    |
| 08/08/2014 02:30:32                    | 23.00     | 429          | 7.13    |
| 08/08/2014 02:45:31                    | 22.98     | 425          | 7.11    |
| 08/08/2014 03:00:31                    | 22.96     | 421          | 7.10    |
| 08/08/2014 03:15:32                    | 22.95     | 416          | 7.09    |



| Station #1 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/08/2014 03:30:32                    | 22.93     | 411          | 7.07    |
| 08/08/2014 03:45:31                    | 22.92     | 406          | 7.06    |
| 08/08/2014 04:00:32                    | 22.90     | 402          | 7.05    |
| 08/08/2014 04:15:32                    | 22.88     | 397          | 7.03    |
| 08/08/2014 04:30:32                    | 22.87     | 393          | 7.02    |
| 08/08/2014 04:45:32                    | 22.85     | 389          | 7.01    |
| 08/08/2014 05:00:31                    | 22.83     | 385          | 6.99    |
| 08/08/2014 05:15:31                    | 22.82     | 382          | 6.99    |
| 08/08/2014 05:30:31                    | 22.81     | 379          | 6.97    |
| 08/08/2014 05:45:31                    | 22.79     | 376          | 6.96    |
| 08/08/2014 06:00:31                    | 22.78     | 373          | 6.95    |
| 08/08/2014 06:15:32                    | 22.77     | 371          | 6.93    |
| 08/08/2014 06:30:31                    | 22.76     | 368          | 6.92    |
| 08/08/2014 06:45:32                    | 22.75     | 367          | 6.91    |
| 08/08/2014 07:00:32                    | 22.75     | 365          | 6.92    |
| 08/08/2014 07:15:32                    | 22.74     | 364          | 6.90    |
| 08/08/2014 07:30:31                    | 22.74     | 362          | 6.90    |
| 08/08/2014 07:45:31                    | 22.75     | 362          | 6.90    |
| 08/08/2014 08:00:32                    | 22.76     | 361          | 6.91    |
| 08/08/2014 08:15:32                    | 22.77     | 360          | 6.91    |
| 08/08/2014 08:30:32                    | 22.77     | 359          | 6.90    |
| 08/08/2014 08:45:32                    | 22.78     | 359          | 6.89    |
| 08/08/2014 09:00:32                    | 22.78     | 358          | 6.90    |
| 08/08/2014 09:15:31                    | 22.79     | 358          | 6.91    |
| 08/08/2014 09:30:31                    | 22.83     | 358          | 6.94    |
| 08/08/2014 09:45:31                    | 22.87     | 358          | 6.97    |
| 08/08/2014 10:00:32                    | 22.96     | 358          | 7.02    |
| 08/08/2014 10:15:32                    | 23.04     | 358          | 7.06    |
| 08/08/2014 10:30:31                    | 23.12     | 358          | 7.10    |
| 08/08/2014 10:45:31                    | 23.20     | 359          | 7.14    |
| 08/08/2014 11:00:31                    | 23.26     | 360          | 7.17    |
| 08/08/2014 11:15:31                    | 23.40     | 361          | 7.25    |
| 08/08/2014 11:30:32                    | 23.45     | 361          | 7.24    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/29/2014 14:00:33                    | 21.40     | 581          | 8.21    |
| 07/29/2014 14:15:32                    | 21.59     | 581          | 8.92    |
| 07/29/2014 14:30:33                    | 21.74     | 582          | 8.97    |
| 07/29/2014 14:45:33                    | 21.97     | 582          | 9.16    |
| 07/29/2014 15:00:32                    | 22.27     | 579          | 9.15    |
| 07/29/2014 15:15:33                    | 22.31     | 580          | 9.67    |
| 07/29/2014 15:30:33                    | 22.73     | 579          | 10.13   |
| 07/29/2014 15:45:33                    | 22.96     | 579          | 10.04   |
| 07/29/2014 16:00:33                    | 23.03     | 580          | 10.19   |
| 07/29/2014 16:15:33                    | 23.38     | 578          | 10.62   |
| 07/29/2014 16:30:33                    | 23.40     | 577          | 10.50   |
| 07/29/2014 16:45:33                    | 23.38     | 577          | 10.52   |
| 07/29/2014 17:00:33                    | 23.50     | 577          | 10.41   |
| 07/29/2014 17:15:33                    | 23.58     | 577          | 10.48   |
| 07/29/2014 17:30:33                    | 23.46     | 576          | 10.70   |
| 07/29/2014 17:45:33                    | 23.43     | 577          | 10.70   |
| 07/29/2014 18:00:33                    | 23.54     | 576          | 10.73   |
| 07/29/2014 18:15:33                    | 23.56     | 575          | 10.73   |
| 07/29/2014 18:30:33                    | 23.62     | 574          | 10.76   |
| 07/29/2014 18:45:33                    | 23.63     | 574          | 10.75   |
| 07/29/2014 19:00:33                    | 23.61     | 575          | 10.73   |
| 07/29/2014 19:15:33                    | 23.57     | 575          | 10.73   |
| 07/29/2014 19:30:33                    | 23.66     | 574          | 10.66   |
| 07/29/2014 19:45:33                    | 23.57     | 574          | 10.67   |
| 07/29/2014 20:00:33                    | 23.59     | 574          | 10.65   |
| 07/29/2014 20:15:33                    | 23.56     | 575          | 10.70   |
| 07/29/2014 20:30:33                    | 23.60     | 574          | 10.75   |
| 07/29/2014 20:45:33                    | 23.58     | 573          | 10.47   |
| 07/29/2014 21:00:33                    | 23.60     | 572          | 10.42   |
| 07/29/2014 21:15:33                    | 23.57     | 573          | 10.42   |
| 07/29/2014 21:30:33                    | 23.43     | 573          | 10.17   |
| 07/29/2014 21:45:33                    | 23.25     | 573          | 10.08   |
| 07/29/2014 22:00:33                    | 23.21     | 572          | 10.25   |
| 07/29/2014 22:15:33                    | 23.12     | 572          | 10.03   |
| 07/29/2014 22:30:33                    | 23.03     | 571          | 9.82    |
| 07/29/2014 22:45:33                    | 22.93     | 572          | 9.44    |
| 07/29/2014 23:00:33                    | 22.80     | 573          | 8.75    |
| 07/29/2014 23:15:33                    | 22.61     | 575          | 8.35    |
| 07/29/2014 23:30:33                    | 22.51     | 576          | 8.13    |
| 07/29/2014 23:45:33                    | 22.43     | 576          | 7.89    |
| 07/30/2014 00:00:33                    | 22.34     | 577          | 7.94    |
| 07/30/2014 00:15:33                    | 22.24     | 577          | 7.49    |
| 07/30/2014 00:30:33                    | 22.14     | 578          | 7.15    |
| 07/30/2014 00:45:33                    | 22.03     | 579          | 6.82    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/30/2014 01:00:33                    | 21.96     | 579          | 6.77    |
| 07/30/2014 01:15:33                    | 21.87     | 580          | 6.45    |
| 07/30/2014 01:30:33                    | 21.78     | 582          | 6.18    |
| 07/30/2014 01:45:33                    | 21.72     | 582          | 5.84    |
| 07/30/2014 02:00:33                    | 21.64     | 583          | 5.62    |
| 07/30/2014 02:15:33                    | 21.56     | 584          | 5.34    |
| 07/30/2014 02:30:33                    | 21.50     | 584          | 5.29    |
| 07/30/2014 02:45:33                    | 21.44     | 585          | 5.12    |
| 07/30/2014 03:00:33                    | 21.42     | 585          | 5.86    |
| 07/30/2014 03:15:33                    | 21.33     | 585          | 5.18    |
| 07/30/2014 03:30:33                    | 21.25     | 585          | 4.63    |
| 07/30/2014 03:45:33                    | 21.21     | 584          | 5.36    |
| 07/30/2014 04:00:33                    | 21.13     | 585          | 4.63    |
| 07/30/2014 04:15:33                    | 21.06     | 587          | 4.38    |
| 07/30/2014 04:30:33                    | 20.99     | 587          | 4.74    |
| 07/30/2014 04:45:33                    | 20.92     | 587          | 4.49    |
| 07/30/2014 05:00:33                    | 20.85     | 588          | 4.09    |
| 07/30/2014 05:15:33                    | 20.75     | 587          | 3.99    |
| 07/30/2014 05:30:33                    | 20.65     | 587          | 3.95    |
| 07/30/2014 05:45:33                    | 20.62     | 588          | 3.85    |
| 07/30/2014 06:00:33                    | 20.56     | 588          | 3.93    |
| 07/30/2014 06:15:33                    | 20.45     | 588          | 3.58    |
| 07/30/2014 06:30:33                    | 20.39     | 588          | 3.60    |
| 07/30/2014 06:45:33                    | 20.32     | 588          | 3.51    |
| 07/30/2014 07:00:33                    | 20.31     | 588          | 3.58    |
| 07/30/2014 07:15:33                    | 20.21     | 589          | 3.41    |
| 07/30/2014 07:30:33                    | 20.21     | 589          | 3.43    |
| 07/30/2014 07:45:33                    | 20.16     | 589          | 3.37    |
| 07/30/2014 08:00:33                    | 20.18     | 589          | 3.47    |
| 07/30/2014 08:15:33                    | 20.17     | 589          | 3.52    |
| 07/30/2014 08:30:33                    | 20.13     | 589          | 3.49    |
| 07/30/2014 08:45:33                    | 20.13     | 589          | 3.58    |
| 07/30/2014 09:00:33                    | 20.14     | 589          | 3.61    |
| 07/30/2014 09:15:33                    | 20.14     | 589          | 3.72    |
| 07/30/2014 09:30:33                    | 20.18     | 588          | 3.76    |
| 07/30/2014 09:45:33                    | 20.16     | 589          | 3.71    |
| 07/30/2014 10:00:33                    | 20.22     | 589          | 3.84    |
| 07/30/2014 10:15:33                    | 20.27     | 589          | 3.95    |
| 07/30/2014 10:30:33                    | 20.33     | 588          | 4.04    |
| 07/30/2014 10:45:33                    | 20.43     | 588          | 4.13    |
| 07/30/2014 11:00:33                    | 20.47     | 588          | 4.23    |
| 07/30/2014 11:15:33                    | 20.57     | 588          | 4.93    |
| 07/30/2014 11:30:33                    | 20.63     | 587          | 5.14    |
| 07/30/2014 11:45:33                    | 20.83     | 586          | 5.78    |
| 07/30/2014 12:00:33                    | 20.91     | 586          | 6.27    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/30/2014 12:15:33                    | 21.00     | 585          | 6.23    |
| 07/30/2014 12:30:33                    | 21.16     | 584          | 7.02    |
| 07/30/2014 12:45:33                    | 21.13     | 584          | 7.06    |
| 07/30/2014 13:00:33                    | 21.09     | 585          | 6.94    |
| 07/30/2014 13:15:33                    | 21.30     | 583          | 7.48    |
| 07/30/2014 13:30:33                    | 21.53     | 582          | 7.50    |
| 07/30/2014 13:45:33                    | 21.68     | 582          | 8.11    |
| 07/30/2014 14:00:33                    | 21.72     | 581          | 8.61    |
| 07/30/2014 14:15:33                    | 21.93     | 579          | 9.23    |
| 07/30/2014 14:30:33                    | 22.15     | 578          | 9.73    |
| 07/30/2014 14:45:33                    | 22.45     | 575          | 10.19   |
| 07/30/2014 15:00:33                    | 22.60     | 575          | 10.74   |
| 07/30/2014 15:15:33                    | 22.72     | 575          | 10.91   |
| 07/30/2014 15:30:33                    | 22.99     | 575          | 10.68   |
| 07/30/2014 15:45:33                    | 22.99     | 576          | 10.35   |
| 07/30/2014 16:00:33                    | 23.23     | 576          | 11.29   |
| 07/30/2014 16:15:33                    | 23.27     | 578          | 10.42   |
| 07/30/2014 16:30:33                    | 23.47     | 576          | 10.71   |
| 07/30/2014 16:45:33                    | 23.55     | 575          | 10.53   |
| 07/30/2014 17:00:33                    | 23.58     | 575          | 10.75   |
| 07/30/2014 17:15:33                    | 23.54     | 574          | 10.78   |
| 07/30/2014 17:30:33                    | 23.53     | 574          | 10.90   |
| 07/30/2014 17:45:33                    | 23.53     | 573          | 10.95   |
| 07/30/2014 18:00:33                    | 23.54     | 573          | 10.93   |
| 07/30/2014 18:15:33                    | 23.50     | 574          | 11.01   |
| 07/30/2014 18:30:33                    | 23.57     | 573          | 11.06   |
| 07/30/2014 18:45:33                    | 23.60     | 572          | 11.02   |
| 07/30/2014 19:00:33                    | 23.61     | 573          | 10.97   |
| 07/30/2014 19:15:33                    | 23.64     | 573          | 10.85   |
| 07/30/2014 19:30:33                    | 23.62     | 573          | 10.75   |
| 07/30/2014 19:45:33                    | 23.61     | 574          | 10.78   |
| 07/30/2014 20:00:33                    | 23.63     | 573          | 10.65   |
| 07/30/2014 20:15:33                    | 23.59     | 574          | 10.53   |
| 07/30/2014 20:30:33                    | 23.57     | 575          | 10.52   |
| 07/30/2014 20:45:33                    | 23.57     | 573          | 10.54   |
| 07/30/2014 21:00:33                    | 23.58     | 573          | 10.26   |
| 07/30/2014 21:15:33                    | 23.62     | 573          | 10.24   |
| 07/30/2014 21:30:33                    | 23.64     | 573          | 10.32   |
| 07/30/2014 21:45:33                    | 23.67     | 571          | 10.40   |
| 07/30/2014 22:00:33                    | 23.71     | 572          | 10.29   |
| 07/30/2014 22:15:33                    | 23.63     | 572          | 10.30   |
| 07/30/2014 22:30:33                    | 23.60     | 567          | 10.77   |
| 07/30/2014 22:45:33                    | 23.52     | 567          | 10.45   |
| 07/30/2014 23:00:33                    | 23.44     | 568          | 10.06   |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/30/2014 23:15:33                    | 23.37     | 569          | 9.31    |
| 07/30/2014 23:30:33                    | 23.25     | 572          | 8.78    |
| 07/30/2014 23:45:33                    | 23.15     | 572          | 8.57    |
| 07/31/2014 00:00:33                    | 23.05     | 573          | 8.03    |
| 07/31/2014 00:15:33                    | 22.97     | 574          | 7.72    |
| 07/31/2014 00:30:33                    | 22.85     | 575          | 7.34    |
| 07/31/2014 00:45:33                    | 22.76     | 576          | 7.01    |
| 07/31/2014 01:00:33                    | 22.69     | 576          | 6.97    |
| 07/31/2014 01:15:33                    | 22.59     | 576          | 7.03    |
| 07/31/2014 01:30:33                    | 22.52     | 577          | 6.76    |
| 07/31/2014 01:45:33                    | 22.42     | 578          | 6.32    |
| 07/31/2014 02:00:33                    | 22.34     | 579          | 6.15    |
| 07/31/2014 02:15:33                    | 22.21     | 580          | 5.43    |
| 07/31/2014 02:30:33                    | 22.14     | 581          | 5.17    |
| 07/31/2014 02:45:33                    | 22.05     | 582          | 4.94    |
| 07/31/2014 03:00:33                    | 21.96     | 583          | 4.91    |
| 07/31/2014 03:15:33                    | 21.91     | 583          | 4.74    |
| 07/31/2014 03:30:33                    | 21.83     | 583          | 4.46    |
| 07/31/2014 03:45:33                    | 21.70     | 584          | 4.33    |
| 07/31/2014 04:00:33                    | 21.61     | 585          | 4.24    |
| 07/31/2014 04:15:33                    | 21.54     | 585          | 4.08    |
| 07/31/2014 04:30:33                    | 21.49     | 585          | 4.15    |
| 07/31/2014 04:45:33                    | 21.37     | 586          | 3.70    |
| 07/31/2014 05:00:33                    | 21.28     | 586          | 3.70    |
| 07/31/2014 05:15:33                    | 21.20     | 586          | 3.68    |
| 07/31/2014 05:30:33                    | 21.13     | 586          | 3.68    |
| 07/31/2014 05:45:33                    | 21.06     | 585          | 3.91    |
| 07/31/2014 06:00:33                    | 20.94     | 584          | 4.02    |
| 07/31/2014 06:15:33                    | 20.83     | 587          | 3.50    |
| 07/31/2014 06:30:33                    | 20.79     | 587          | 3.58    |
| 07/31/2014 06:45:33                    | 20.73     | 587          | 3.49    |
| 07/31/2014 07:00:33                    | 20.65     | 587          | 3.47    |
| 07/31/2014 07:15:33                    | 20.54     | 587          | 3.67    |
| 07/31/2014 07:30:33                    | 20.51     | 587          | 3.46    |
| 07/31/2014 07:45:33                    | 20.42     | 588          | 3.46    |
| 07/31/2014 08:00:33                    | 20.37     | 588          | 3.31    |
| 07/31/2014 08:15:33                    | 20.37     | 588          | 3.39    |
| 07/31/2014 08:30:33                    | 20.37     | 588          | 3.24    |
| 07/31/2014 08:45:33                    | 20.34     | 588          | 3.58    |
| 07/31/2014 09:00:33                    | 20.32     | 589          | 3.37    |
| 07/31/2014 09:15:33                    | 20.37     | 588          | 3.61    |
| 07/31/2014 09:30:33                    | 20.36     | 588          | 3.55    |
| 07/31/2014 09:45:33                    | 20.39     | 587          | 3.78    |
| 07/31/2014 10:00:33                    | 20.39     | 588          | 3.74    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/31/2014 10:15:33                    | 20.48     | 587          | 3.79    |
| 07/31/2014 10:30:33                    | 20.52     | 587          | 3.79    |
| 07/31/2014 10:45:33                    | 20.56     | 587          | 3.88    |
| 07/31/2014 11:00:33                    | 20.58     | 587          | 3.93    |
| 07/31/2014 11:15:33                    | 20.70     | 586          | 4.31    |
| 07/31/2014 11:30:33                    | 20.74     | 586          | 4.66    |
| 07/31/2014 11:45:33                    | 20.85     | 585          | 4.85    |
| 07/31/2014 12:00:33                    | 20.91     | 586          | 4.89    |
| 07/31/2014 12:15:33                    | 20.98     | 586          | 5.07    |
| 07/31/2014 12:30:33                    | 21.21     | 585          | 5.82    |
| 07/31/2014 12:45:33                    | 21.36     | 584          | 6.57    |
| 07/31/2014 13:00:33                    | 21.75     | 580          | 7.35    |
| 07/31/2014 13:15:33                    | 22.09     | 580          | 8.11    |
| 07/31/2014 13:30:33                    | 22.32     | 579          | 8.95    |
| 07/31/2014 13:45:33                    | 22.02     | 580          | 8.42    |
| 07/31/2014 14:00:33                    | 22.41     | 580          | 8.52    |
| 07/31/2014 14:15:33                    | 22.39     | 578          | 9.24    |
| 07/31/2014 14:30:33                    | 22.58     | 576          | 9.23    |
| 07/31/2014 14:45:33                    | 22.69     | 577          | 9.07    |
| 07/31/2014 15:00:33                    | 22.94     | 577          | 9.01    |
| 07/31/2014 15:15:33                    | 23.14     | 579          | 9.84    |
| 07/31/2014 15:30:33                    | 23.37     | 577          | 10.85   |
| 07/31/2014 15:45:33                    | 23.64     | 575          | 10.61   |
| 07/31/2014 16:00:33                    | 23.87     | 574          | 11.21   |
| 07/31/2014 16:15:33                    | 24.03     | 573          | 10.35   |
| 07/31/2014 16:30:33                    | 24.10     | 572          | 10.85   |
| 07/31/2014 16:45:33                    | 24.13     | 572          | 10.71   |
| 07/31/2014 17:00:33                    | 24.17     | 572          | 10.57   |
| 07/31/2014 17:15:33                    | 24.18     | 572          | 10.17   |
| 07/31/2014 17:30:33                    | 24.10     | 573          | 10.30   |
| 07/31/2014 17:45:33                    | 24.15     | 573          | 10.10   |
| 07/31/2014 18:00:33                    | 24.16     | 573          | 10.27   |
| 07/31/2014 18:15:33                    | 24.17     | 572          | 10.48   |
| 07/31/2014 18:30:33                    | 24.16     | 572          | 10.60   |
| 07/31/2014 18:45:33                    | 24.11     | 573          | 10.69   |
| 07/31/2014 19:00:33                    | 24.13     | 572          | 10.48   |
| 07/31/2014 19:15:33                    | 24.14     | 572          | 10.34   |
| 07/31/2014 19:30:33                    | 24.15     | 572          | 10.26   |
| 07/31/2014 19:45:33                    | 24.15     | 572          | 10.22   |
| 07/31/2014 20:00:33                    | 24.10     | 573          | 10.10   |
| 07/31/2014 20:15:33                    | 24.14     | 573          | 10.08   |
| 07/31/2014 20:30:33                    | 24.08     | 573          | 10.00   |
| 07/31/2014 20:45:33                    | 24.02     | 574          | 9.89    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 07/31/2014 21:00:33                    | 24.11     | 573          | 9.83    |
| 07/31/2014 21:15:33                    | 24.13     | 573          | 9.84    |
| 07/31/2014 21:30:33                    | 24.11     | 573          | 9.92    |
| 07/31/2014 21:45:33                    | 24.08     | 573          | 9.93    |
| 07/31/2014 22:00:33                    | 24.19     | 572          | 9.82    |
| 07/31/2014 22:15:33                    | 24.25     | 571          | 9.94    |
| 07/31/2014 22:30:33                    | 24.31     | 568          | 9.80    |
| 07/31/2014 22:45:33                    | 24.25     | 568          | 9.83    |
| 07/31/2014 23:00:33                    | 24.18     | 568          | 9.67    |
| 07/31/2014 23:15:33                    | 24.09     | 568          | 9.37    |
| 07/31/2014 23:30:33                    | 23.95     | 570          | 9.03    |
| 07/31/2014 23:45:33                    | 23.83     | 570          | 8.79    |
| 08/01/2014 00:00:33                    | 23.73     | 570          | 8.30    |
| 08/01/2014 00:15:33                    | 23.59     | 573          | 7.80    |
| 08/01/2014 00:30:33                    | 23.48     | 573          | 7.71    |
| 08/01/2014 00:45:33                    | 23.42     | 572          | 7.67    |
| 08/01/2014 01:00:33                    | 23.33     | 572          | 7.68    |
| 08/01/2014 01:15:33                    | 23.19     | 574          | 7.38    |
| 08/01/2014 01:30:33                    | 23.07     | 574          | 7.10    |
| 08/01/2014 01:45:33                    | 23.01     | 575          | 6.57    |
| 08/01/2014 02:00:33                    | 22.86     | 577          | 6.15    |
| 08/01/2014 02:15:33                    | 22.79     | 578          | 5.67    |
| 08/01/2014 02:30:33                    | 22.65     | 580          | 5.47    |
| 08/01/2014 02:45:33                    | 22.59     | 580          | 5.21    |
| 08/01/2014 03:00:33                    | 22.52     | 581          | 5.09    |
| 08/01/2014 03:15:33                    | 22.38     | 582          | 4.68    |
| 08/01/2014 03:30:33                    | 22.28     | 583          | 4.55    |
| 08/01/2014 03:45:33                    | 22.21     | 583          | 4.35    |
| 08/01/2014 04:00:33                    | 22.16     | 582          | 4.39    |
| 08/01/2014 04:15:33                    | 22.05     | 584          | 4.09    |
| 08/01/2014 04:30:33                    | 22.00     | 584          | 4.03    |
| 08/01/2014 04:45:33                    | 21.90     | 584          | 4.22    |
| 08/01/2014 05:00:33                    | 21.86     | 584          | 4.00    |
| 08/01/2014 05:15:33                    | 21.71     | 585          | 3.64    |
| 08/01/2014 05:30:33                    | 21.64     | 585          | 3.87    |
| 08/01/2014 05:45:33                    | 21.60     | 585          | 3.48    |
| 08/01/2014 06:00:33                    | 21.50     | 585          | 3.63    |
| 08/01/2014 06:15:33                    | 21.48     | 586          | 3.54    |
| 08/01/2014 06:30:33                    | 21.30     | 583          | 4.19    |
| 08/01/2014 06:45:33                    | 21.16     | 586          | 3.44    |
| 08/01/2014 07:00:33                    | 21.15     | 587          | 3.60    |
| 08/01/2014 07:15:33                    | 21.12     | 586          | 4.39    |
| 08/01/2014 07:30:33                    | 21.08     | 586          | 4.25    |
| 08/01/2014 07:45:33                    | 21.05     | 586          | 3.92    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/01/2014 08:00:33                    | 21.02     | 586          | 3.76    |
| 08/01/2014 08:15:33                    | 21.00     | 587          | 3.33    |
| 08/01/2014 08:30:33                    | 20.96     | 588          | 3.56    |
| 08/01/2014 08:45:33                    | 20.94     | 588          | 3.97    |
| 08/01/2014 09:00:33                    | 20.98     | 585          | 4.04    |
| 08/01/2014 09:15:33                    | 20.99     | 586          | 3.68    |
| 08/01/2014 09:30:33                    | 21.01     | 587          | 3.56    |
| 08/01/2014 09:45:33                    | 21.05     | 586          | 3.59    |
| 08/01/2014 10:00:33                    | 21.08     | 586          | 3.68    |
| 08/01/2014 10:15:33                    | 21.18     | 584          | 3.92    |
| 08/01/2014 10:30:33                    | 21.15     | 585          | 3.68    |
| 08/01/2014 10:45:33                    | 21.17     | 585          | 3.84    |
| 08/01/2014 11:00:33                    | 21.21     | 586          | 3.64    |
| 08/01/2014 11:15:33                    | 21.28     | 586          | 3.59    |
| 08/01/2014 11:30:33                    | 21.37     | 587          | 3.93    |
| 08/01/2014 11:45:33                    | 21.48     | 587          | 4.33    |
| 08/01/2014 12:00:33                    | 21.62     | 585          | 4.89    |
| 08/01/2014 12:15:33                    | 21.71     | 582          | 5.68    |
| 08/01/2014 12:30:33                    | 21.89     | 584          | 6.01    |
| 08/01/2014 12:45:33                    | 21.84     | 584          | 6.16    |
| 08/01/2014 13:00:33                    | 21.90     | 583          | 6.18    |
| 08/01/2014 13:15:33                    | 21.89     | 582          | 6.22    |
| 08/01/2014 13:30:33                    | 21.83     | 581          | 6.15    |
| 08/01/2014 13:45:33                    | 21.98     | 580          | 7.09    |
| 08/01/2014 14:00:33                    | 22.15     | 577          | 7.45    |
| 08/01/2014 14:15:33                    | 22.20     | 571          | 7.65    |
| 08/01/2014 14:30:33                    | 22.06     | 572          | 7.50    |
| 08/01/2014 14:45:33                    | 22.09     | 572          | 7.31    |
| 08/01/2014 15:00:33                    | 22.16     | 568          | 7.58    |
| 08/01/2014 15:15:33                    | 22.15     | 568          | 7.52    |
| 08/01/2014 15:30:33                    | 22.13     | 567          | 7.70    |
| 08/01/2014 15:45:33                    | 22.06     | 568          | 7.35    |
| 08/01/2014 16:00:33                    | 22.09     | 569          | 7.13    |
| 08/01/2014 16:15:33                    | 22.11     | 567          | 7.52    |
| 08/01/2014 16:30:33                    | 22.12     | 567          | 7.50    |
| 08/01/2014 16:45:33                    | 22.13     | 567          | 7.45    |
| 08/01/2014 17:00:33                    | 22.13     | 567          | 7.49    |
| 08/01/2014 17:15:33                    | 22.12     | 568          | 7.52    |
| 08/01/2014 17:30:33                    | 22.13     | 565          | 7.69    |
| 08/01/2014 17:45:33                    | 22.10     | 563          | 7.84    |
| 08/01/2014 18:00:33                    | 22.12     | 563          | 7.80    |
| 08/01/2014 18:15:33                    | 22.13     | 561          | 7.81    |
| 08/01/2014 18:30:33                    | 22.12     | 561          | 7.75    |
| 08/01/2014 18:45:33                    | 22.12     | 561          | 7.75    |



| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/01/2014 19:00:33                    | 22.13     | 561          | 7.82    |
| 08/01/2014 19:15:33                    | 22.11     | 561          | 7.71    |
| 08/01/2014 19:30:33                    | 22.11     | 562          | 7.72    |
| 08/01/2014 19:45:33                    | 22.10     | 562          | 7.69    |
| 08/01/2014 20:00:33                    | 22.07     | 562          | 7.47    |
| 08/01/2014 20:15:33                    | 22.04     | 563          | 7.41    |
| 08/01/2014 20:30:33                    | 22.03     | 562          | 7.37    |
| 08/01/2014 20:45:33                    | 21.98     | 563          | 7.23    |
| 08/01/2014 21:00:33                    | 21.96     | 563          | 7.13    |
| 08/01/2014 21:15:33                    | 21.93     | 563          | 7.05    |
| 08/01/2014 21:30:33                    | 21.88     | 563          | 6.99    |
| 08/01/2014 21:45:33                    | 21.83     | 563          | 6.89    |
| 08/01/2014 22:00:33                    | 21.77     | 563          | 6.85    |
| 08/01/2014 22:15:33                    | 21.74     | 563          | 6.59    |
| 08/01/2014 22:30:33                    | 21.68     | 564          | 6.42    |
| 08/01/2014 22:45:33                    | 21.64     | 564          | 6.27    |
| 08/01/2014 23:00:33                    | 21.61     | 565          | 6.21    |
| 08/01/2014 23:15:33                    | 21.57     | 565          | 6.00    |
| 08/01/2014 23:30:33                    | 21.53     | 565          | 5.60    |
| 08/01/2014 23:45:33                    | 21.47     | 567          | 5.43    |
| 08/02/2014 00:00:33                    | 21.41     | 567          | 5.31    |
| 08/02/2014 00:15:33                    | 21.37     | 567          | 5.29    |
| 08/02/2014 00:30:33                    | 21.29     | 569          | 4.84    |
| 08/02/2014 00:45:33                    | 21.23     | 570          | 4.64    |
| 08/02/2014 01:00:33                    | 21.15     | 571          | 4.49    |
| 08/02/2014 01:15:33                    | 21.12     | 571          | 4.38    |
| 08/02/2014 01:30:33                    | 21.05     | 572          | 4.26    |
| 08/02/2014 01:45:33                    | 21.01     | 573          | 4.14    |
| 08/02/2014 02:00:33                    | 20.96     | 573          | 4.00    |
| 08/02/2014 02:15:33                    | 20.90     | 574          | 3.83    |
| 08/02/2014 02:30:33                    | 20.84     | 574          | 3.88    |
| 08/02/2014 02:45:33                    | 20.79     | 575          | 3.69    |
| 08/02/2014 03:00:33                    | 20.75     | 575          | 4.00    |
| 08/02/2014 03:15:33                    | 20.73     | 575          | 3.73    |
| 08/02/2014 03:30:33                    | 20.62     | 576          | 3.52    |
| 08/02/2014 03:45:33                    | 20.57     | 577          | 3.39    |
| 08/02/2014 04:00:33                    | 20.55     | 578          | 3.29    |
| 08/02/2014 04:15:33                    | 20.50     | 578          | 3.26    |
| 08/02/2014 04:30:33                    | 20.47     | 579          | 3.14    |
| 08/02/2014 04:45:33                    | 20.44     | 579          | 3.15    |
| 08/02/2014 05:00:33                    | 20.41     | 579          | 3.08    |
| 08/02/2014 05:15:33                    | 20.38     | 580          | 3.05    |
| 08/02/2014 05:30:33                    | 20.36     | 579          | 3.10    |
| 08/02/2014 05:45:33                    | 20.35     | 579          | 3.17    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/02/2014 06:00:33                    | 20.29     | 580          | 3.06    |
| 08/02/2014 06:15:33                    | 20.24     | 580          | 3.01    |
| 08/02/2014 06:30:33                    | 20.25     | 580          | 2.95    |
| 08/02/2014 06:45:33                    | 20.20     | 580          | 2.93    |
| 08/02/2014 07:00:33                    | 20.18     | 580          | 2.97    |
| 08/02/2014 07:15:33                    | 20.15     | 580          | 3.09    |
| 08/02/2014 07:30:33                    | 20.15     | 580          | 3.01    |
| 08/02/2014 07:45:33                    | 20.15     | 580          | 3.06    |
| 08/02/2014 08:00:33                    | 20.18     | 580          | 3.01    |
| 08/02/2014 08:15:33                    | 20.18     | 579          | 3.24    |
| 08/02/2014 08:30:33                    | 20.20     | 579          | 3.25    |
| 08/02/2014 08:45:33                    | 20.20     | 579          | 3.50    |
| 08/02/2014 09:00:33                    | 20.21     | 579          | 3.55    |
| 08/02/2014 09:15:33                    | 20.24     | 579          | 3.58    |
| 08/02/2014 09:30:33                    | 20.25     | 579          | 3.71    |
| 08/02/2014 09:45:33                    | 20.29     | 579          | 3.76    |
| 08/02/2014 10:00:33                    | 20.31     | 579          | 3.93    |
| 08/02/2014 10:15:33                    | 20.33     | 579          | 4.06    |
| 08/02/2014 10:30:33                    | 20.35     | 579          | 4.26    |
| 08/02/2014 10:45:33                    | 20.39     | 580          | 4.31    |
| 08/02/2014 11:00:33                    | 20.42     | 580          | 4.46    |
| 08/02/2014 11:15:33                    | 20.47     | 580          | 4.62    |
| 08/02/2014 11:30:33                    | 20.52     | 580          | 4.68    |
| 08/02/2014 11:45:33                    | 20.54     | 579          | 4.70    |
| 08/02/2014 12:00:33                    | 20.56     | 580          | 4.69    |
| 08/02/2014 12:15:33                    | 20.62     | 580          | 4.76    |
| 08/02/2014 12:30:33                    | 20.69     | 579          | 4.94    |
| 08/02/2014 12:45:33                    | 20.75     | 579          | 5.12    |
| 08/02/2014 13:00:33                    | 20.84     | 579          | 5.07    |
| 08/02/2014 13:15:33                    | 21.04     | 579          | 5.55    |
| 08/02/2014 13:30:33                    | 21.16     | 578          | 5.95    |
| 08/02/2014 13:45:33                    | 21.32     | 578          | 6.85    |
| 08/02/2014 14:00:33                    | 21.60     | 578          | 6.92    |
| 08/02/2014 14:15:33                    | 21.68     | 578          | 6.88    |
| 08/02/2014 14:30:33                    | 22.06     | 577          | 8.46    |
| 08/02/2014 14:45:33                    | 22.20     | 576          | 7.46    |
| 08/02/2014 15:00:33                    | 22.51     | 576          | 8.68    |
| 08/02/2014 15:15:33                    | 22.79     | 575          | 9.45    |
| 08/02/2014 15:30:33                    | 22.76     | 574          | 9.87    |
| 08/02/2014 15:45:33                    | 23.24     | 573          | 8.73    |
| 08/02/2014 16:00:33                    | 23.36     | 574          | 10.53   |
| 08/02/2014 16:15:33                    | 23.54     | 573          | 10.71   |
| 08/02/2014 16:30:33                    | 23.56     | 574          | 9.52    |
| 08/02/2014 16:45:33                    | 23.65     | 573          | 9.23    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/02/2014 17:00:33                    | 23.67     | 572          | 9.35    |
| 08/02/2014 17:15:33                    | 23.81     | 570          | 9.37    |
| 08/02/2014 17:30:33                    | 23.77     | 570          | 9.54    |
| 08/02/2014 17:45:33                    | 23.84     | 570          | 9.60    |
| 08/02/2014 18:00:33                    | 23.80     | 570          | 9.63    |
| 08/02/2014 18:15:33                    | 23.81     | 570          | 9.72    |
| 08/02/2014 18:30:33                    | 23.84     | 570          | 9.78    |
| 08/02/2014 18:45:33                    | 23.84     | 570          | 9.77    |
| 08/02/2014 19:00:33                    | 23.82     | 570          | 9.57    |
| 08/02/2014 19:15:33                    | 23.84     | 570          | 9.52    |
| 08/02/2014 19:30:33                    | 23.86     | 569          | 9.52    |
| 08/02/2014 19:45:33                    | 23.85     | 569          | 9.51    |
| 08/02/2014 20:00:33                    | 23.85     | 570          | 9.57    |
| 08/02/2014 20:15:33                    | 23.84     | 570          | 9.40    |
| 08/02/2014 20:30:33                    | 23.84     | 570          | 9.34    |
| 08/02/2014 20:45:33                    | 23.84     | 570          | 9.29    |
| 08/02/2014 21:00:33                    | 23.84     | 570          | 9.17    |
| 08/02/2014 21:15:33                    | 23.82     | 570          | 9.07    |
| 08/02/2014 21:30:33                    | 23.86     | 570          | 9.05    |
| 08/02/2014 21:45:33                    | 23.90     | 570          | 8.97    |
| 08/02/2014 22:00:33                    | 23.83     | 570          | 9.06    |
| 08/02/2014 22:15:33                    | 23.88     | 570          | 8.84    |
| 08/02/2014 22:30:33                    | 23.85     | 570          | 8.91    |
| 08/02/2014 22:45:33                    | 23.85     | 570          | 8.92    |
| 08/02/2014 23:00:33                    | 23.82     | 570          | 9.36    |
| 08/02/2014 23:15:33                    | 23.75     | 570          | 9.91    |
| 08/02/2014 23:30:33                    | 23.66     | 569          | 9.42    |
| 08/02/2014 23:45:33                    | 23.63     | 567          | 9.20    |
| 08/03/2014 00:00:33                    | 23.56     | 566          | 9.02    |
| 08/03/2014 00:15:33                    | 23.47     | 568          | 7.98    |
| 08/03/2014 00:30:33                    | 23.34     | 569          | 7.73    |
| 08/03/2014 00:45:33                    | 23.23     | 570          | 7.33    |
| 08/03/2014 01:00:33                    | 23.12     | 571          | 6.99    |
| 08/03/2014 01:15:33                    | 22.97     | 571          | 7.07    |
| 08/03/2014 01:30:33                    | 22.90     | 572          | 6.35    |
| 08/03/2014 01:45:33                    | 22.77     | 575          | 5.87    |
| 08/03/2014 02:00:33                    | 22.68     | 575          | 5.92    |
| 08/03/2014 02:15:33                    | 22.59     | 575          | 5.70    |
| 08/03/2014 02:30:33                    | 22.47     | 576          | 5.30    |
| 08/03/2014 02:45:33                    | 22.39     | 577          | 5.22    |
| 08/03/2014 03:00:33                    | 22.32     | 578          | 5.31    |
| 08/03/2014 03:15:33                    | 22.19     | 579          | 4.55    |
| 08/03/2014 03:30:33                    | 22.10     | 579          | 4.51    |
| 08/03/2014 03:45:33                    | 22.01     | 580          | 4.70    |
| 08/03/2014 04:00:33                    | 21.91     | 581          | 3.96    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/03/2014 04:15:33                    | 21.81     | 581          | 4.07    |
| 08/03/2014 04:30:33                    | 21.77     | 579          | 4.11    |
| 08/03/2014 04:45:33                    | 21.69     | 581          | 3.79    |
| 08/03/2014 05:00:33                    | 21.56     | 581          | 3.70    |
| 08/03/2014 05:15:33                    | 21.47     | 582          | 3.48    |
| 08/03/2014 05:30:33                    | 21.34     | 582          | 3.81    |
| 08/03/2014 05:45:33                    | 21.25     | 583          | 3.54    |
| 08/03/2014 06:00:33                    | 21.20     | 582          | 3.46    |
| 08/03/2014 06:15:33                    | 21.13     | 582          | 3.61    |
| 08/03/2014 06:30:33                    | 20.97     | 582          | 3.45    |
| 08/03/2014 06:45:33                    | 20.91     | 584          | 3.43    |
| 08/03/2014 07:00:33                    | 20.87     | 584          | 3.35    |
| 08/03/2014 07:15:33                    | 20.76     | 585          | 3.24    |
| 08/03/2014 07:30:33                    | 20.72     | 584          | 3.34    |
| 08/03/2014 07:45:33                    | 20.71     | 585          | 3.82    |
| 08/03/2014 08:00:33                    | 20.65     | 584          | 3.33    |
| 08/03/2014 08:15:33                    | 20.60     | 584          | 3.43    |
| 08/03/2014 08:30:33                    | 20.61     | 585          | 3.47    |
| 08/03/2014 08:45:33                    | 20.63     | 584          | 3.49    |
| 08/03/2014 09:00:33                    | 20.53     | 585          | 3.98    |
| 08/03/2014 09:15:33                    | 20.58     | 583          | 4.17    |
| 08/03/2014 09:30:33                    | 20.58     | 583          | 4.19    |
| 08/03/2014 09:45:33                    | 20.60     | 582          | 4.27    |
| 08/03/2014 10:00:33                    | 20.67     | 582          | 4.31    |
| 08/03/2014 10:15:33                    | 20.65     | 581          | 4.11    |
| 08/03/2014 10:30:33                    | 20.74     | 581          | 4.36    |
| 08/03/2014 10:45:33                    | 20.73     | 582          | 3.86    |
| 08/03/2014 11:00:33                    | 20.80     | 582          | 3.82    |
| 08/03/2014 11:15:33                    | 20.83     | 583          | 4.09    |
| 08/03/2014 11:30:33                    | 20.93     | 582          | 4.38    |
| 08/03/2014 11:45:33                    | 20.87     | 583          | 4.15    |
| 08/03/2014 12:00:33                    | 21.01     | 582          | 4.41    |
| 08/03/2014 12:15:33                    | 21.14     | 582          | 5.09    |
| 08/03/2014 12:30:33                    | 21.19     | 580          | 5.29    |
| 08/03/2014 12:45:33                    | 21.27     | 580          | 5.76    |
| 08/03/2014 13:00:33                    | 21.32     | 579          | 5.74    |
| 08/03/2014 13:15:33                    | 21.38     | 579          | 6.11    |
| 08/03/2014 13:30:33                    | 21.70     | 577          | 6.47    |
| 08/03/2014 13:45:33                    | 21.88     | 576          | 7.23    |
| 08/03/2014 14:00:33                    | 22.01     | 574          | 7.81    |
| 08/03/2014 14:15:33                    | 22.18     | 572          | 8.05    |
| 08/03/2014 14:30:33                    | 22.48     | 571          | 9.30    |
| 08/03/2014 14:45:33                    | 22.79     | 569          | 9.23    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/03/2014 15:00:33                    | 23.03     | 570          | 10.56   |
| 08/03/2014 15:15:33                    | 23.25     | 569          | 9.82    |
| 08/03/2014 15:30:33                    | 24.59     | 569          | 10.01   |
| 08/03/2014 15:45:33                    | 24.63     | 571          | 10.14   |
| 08/03/2014 16:00:33                    | 24.64     | 570          | 10.25   |
| 08/03/2014 16:15:33                    | 24.66     | 570          | 10.83   |
| 08/03/2014 16:30:33                    | 24.77     | 569          | 11.71   |
| 08/03/2014 16:45:33                    | 24.68     | 567          | 11.38   |
| 08/03/2014 17:00:33                    | 24.73     | 567          | 11.16   |
| 08/03/2014 17:15:33                    | 24.68     | 567          | 11.45   |
| 08/03/2014 17:30:33                    | 24.73     | 567          | 10.85   |
| 08/03/2014 17:45:33                    | 24.69     | 567          | 10.96   |
| 08/03/2014 18:00:33                    | 24.66     | 567          | 10.75   |
| 08/03/2014 18:15:33                    | 24.65     | 566          | 10.69   |
| 08/03/2014 18:30:33                    | 24.60     | 566          | 10.71   |
| 08/03/2014 18:45:33                    | 24.57     | 566          | 10.72   |
| 08/03/2014 19:00:33                    | 24.52     | 566          | 10.68   |
| 08/03/2014 19:15:33                    | 24.51     | 566          | 10.66   |
| 08/03/2014 19:30:33                    | 24.53     | 566          | 10.48   |
| 08/03/2014 19:45:33                    | 24.49     | 567          | 10.29   |
| 08/03/2014 20:00:33                    | 24.51     | 566          | 10.02   |
| 08/03/2014 20:15:33                    | 24.47     | 566          | 9.87    |
| 08/03/2014 20:30:33                    | 24.49     | 567          | 9.56    |
| 08/03/2014 20:45:33                    | 24.37     | 567          | 9.60    |
| 08/03/2014 21:00:33                    | 24.52     | 566          | 9.60    |
| 08/03/2014 21:15:33                    | 24.49     | 567          | 9.53    |
| 08/03/2014 21:30:33                    | 24.46     | 567          | 9.45    |
| 08/03/2014 21:45:33                    | 24.47     | 567          | 9.47    |
| 08/03/2014 22:00:33                    | 24.45     | 567          | 9.54    |
| 08/03/2014 22:15:33                    | 24.50     | 566          | 9.66    |
| 08/03/2014 22:30:33                    | 24.52     | 564          | 9.73    |
| 08/03/2014 22:45:33                    | 24.50     | 564          | 9.73    |
| 08/03/2014 23:00:33                    | 24.39     | 563          | 9.56    |
| 08/03/2014 23:15:33                    | 24.31     | 563          | 9.35    |
| 08/03/2014 23:30:33                    | 24.18     | 564          | 8.98    |
| 08/03/2014 23:45:33                    | 24.05     | 565          | 8.69    |
| 08/04/2014 00:00:33                    | 23.96     | 565          | 8.25    |
| 08/04/2014 00:15:33                    | 23.86     | 567          | 7.83    |
| 08/04/2014 00:30:33                    | 23.78     | 568          | 7.64    |
| 08/04/2014 00:45:33                    | 23.71     | 569          | 7.74    |
| 08/04/2014 01:00:33                    | 23.60     | 569          | 7.27    |
| 08/04/2014 01:15:33                    | 23.55     | 568          | 7.53    |
| 08/04/2014 01:30:33                    | 23.42     | 569          | 7.13    |
| 08/04/2014 01:45:33                    | 23.35     | 571          | 6.76    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/04/2014 02:00:33                    | 23.28     | 572          | 6.24    |
| 08/04/2014 02:15:33                    | 23.14     | 574          | 6.05    |
| 08/04/2014 02:30:33                    | 23.05     | 575          | 5.57    |
| 08/04/2014 02:45:33                    | 22.97     | 576          | 5.30    |
| 08/04/2014 03:00:33                    | 22.88     | 576          | 5.86    |
| 08/04/2014 03:15:33                    | 22.79     | 578          | 4.72    |
| 08/04/2014 03:30:33                    | 22.75     | 578          | 5.30    |
| 08/04/2014 03:45:33                    | 22.66     | 578          | 4.92    |
| 08/04/2014 04:00:33                    | 22.56     | 579          | 4.40    |
| 08/04/2014 04:15:33                    | 22.47     | 580          | 4.00    |
| 08/04/2014 04:30:33                    | 22.41     | 580          | 4.07    |
| 08/04/2014 04:45:33                    | 22.38     | 579          | 4.27    |
| 08/04/2014 05:00:33                    | 22.25     | 580          | 3.98    |
| 08/04/2014 05:15:33                    | 22.22     | 580          | 3.81    |
| 08/04/2014 05:30:33                    | 22.11     | 581          | 3.75    |
| 08/04/2014 05:45:33                    | 22.00     | 582          | 3.55    |
| 08/04/2014 06:00:33                    | 21.94     | 582          | 3.35    |
| 08/04/2014 06:15:33                    | 21.89     | 582          | 3.47    |
| 08/04/2014 06:30:33                    | 21.80     | 581          | 3.66    |
| 08/04/2014 06:45:33                    | 21.70     | 583          | 3.67    |
| 08/04/2014 07:00:33                    | 21.67     | 581          | 3.91    |
| 08/04/2014 07:15:33                    | 21.60     | 583          | 3.76    |
| 08/04/2014 07:30:33                    | 21.55     | 583          | 3.41    |
| 08/04/2014 07:45:33                    | 21.50     | 583          | 3.70    |
| 08/04/2014 08:00:33                    | 21.52     | 583          | 4.28    |
| 08/04/2014 08:15:33                    | 21.51     | 583          | 4.09    |
| 08/04/2014 08:30:33                    | 21.53     | 582          | 4.20    |
| 08/04/2014 08:45:33                    | 21.52     | 583          | 3.96    |
| 08/04/2014 09:00:33                    | 21.61     | 581          | 4.27    |
| 08/04/2014 09:15:33                    | 21.58     | 581          | 4.16    |
| 08/04/2014 09:30:33                    | 21.60     | 581          | 3.98    |
| 08/04/2014 09:45:33                    | 21.62     | 581          | 3.86    |
| 08/04/2014 10:00:33                    | 21.70     | 582          | 4.95    |
| 08/04/2014 10:15:33                    | 21.65     | 580          | 4.46    |
| 08/04/2014 10:30:33                    | 21.71     | 580          | 4.57    |
| 08/04/2014 10:45:33                    | 21.81     | 581          | 4.81    |
| 08/04/2014 11:00:33                    | 21.87     | 581          | 5.10    |
| 08/04/2014 11:15:33                    | 22.07     | 579          | 5.89    |
| 08/04/2014 11:30:33                    | 22.08     | 578          | 5.92    |
| 08/04/2014 11:45:33                    | 22.24     | 577          | 6.67    |
| 08/04/2014 12:00:33                    | 22.26     | 578          | 6.64    |
| 08/04/2014 12:15:33                    | 22.50     | 577          | 7.17    |
| 08/04/2014 12:30:33                    | 22.42     | 577          | 6.92    |
| 08/04/2014 12:45:33                    | 22.46     | 578          | 7.09    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/04/2014 13:00:33                    | 22.59     | 577          | 7.45    |
| 08/04/2014 13:15:33                    | 23.02     | 574          | 9.11    |
| 08/04/2014 13:30:33                    | 23.01     | 575          | 9.19    |
| 08/04/2014 13:45:33                    | 23.06     | 573          | 8.56    |
| 08/04/2014 14:00:33                    | 23.35     | 571          | 9.44    |
| 08/04/2014 14:15:33                    | 23.55     | 569          | 9.45    |
| 08/04/2014 14:30:33                    | 23.82     | 568          | 10.20   |
| 08/04/2014 14:45:33                    | 24.08     | 567          | 10.42   |
| 08/04/2014 15:00:33                    | 24.36     | 567          | 11.09   |
| 08/04/2014 15:15:33                    | 24.40     | 568          | 11.42   |
| 08/04/2014 15:30:33                    | 24.50     | 568          | 12.45   |
| 08/04/2014 15:45:33                    | 24.95     | 565          | 11.82   |
| 08/04/2014 16:00:33                    | 25.13     | 566          | 11.57   |
| 08/04/2014 16:15:33                    | 25.28     | 568          | 12.18   |
| 08/04/2014 16:30:33                    | 25.27     | 566          | 13.63   |
| 08/04/2014 16:45:33                    | 25.36     | 563          | 12.24   |
| 08/04/2014 17:00:33                    | 25.35     | 566          | 11.68   |
| 08/04/2014 17:15:33                    | 25.39     | 566          | 11.74   |
| 08/04/2014 17:30:33                    | 25.44     | 567          | 11.35   |
| 08/04/2014 17:45:33                    | 25.43     | 566          | 11.50   |
| 08/04/2014 18:00:33                    | 25.45     | 566          | 11.18   |
| 08/04/2014 18:15:33                    | 25.45     | 566          | 11.44   |
| 08/04/2014 18:30:33                    | 25.40     | 567          | 11.18   |
| 08/04/2014 18:45:33                    | 25.35     | 569          | 11.20   |
| 08/04/2014 19:00:33                    | 25.42     | 568          | 11.16   |
| 08/04/2014 19:15:33                    | 25.43     | 568          | 11.08   |
| 08/04/2014 19:30:33                    | 25.41     | 567          | 11.08   |
| 08/04/2014 19:45:33                    | 25.41     | 567          | 10.90   |
| 08/04/2014 20:00:33                    | 25.37     | 568          | 10.76   |
| 08/04/2014 20:15:33                    | 25.40     | 568          | 10.63   |
| 08/04/2014 20:30:33                    | 25.39     | 568          | 10.43   |
| 08/04/2014 20:45:33                    | 25.39     | 568          | 10.33   |
| 08/04/2014 21:00:33                    | 25.43     | 568          | 10.16   |
| 08/04/2014 21:15:33                    | 25.39     | 569          | 10.21   |
| 08/04/2014 21:30:33                    | 25.39     | 569          | 10.23   |
| 08/04/2014 21:45:33                    | 25.39     | 569          | 10.21   |
| 08/04/2014 22:00:33                    | 25.34     | 569          | 10.13   |
| 08/04/2014 22:15:33                    | 25.40     | 569          | 10.06   |
| 08/04/2014 22:30:33                    | 25.39     | 569          | 10.14   |
| 08/04/2014 22:45:33                    | 25.48     | 564          | 10.09   |
| 08/04/2014 23:00:33                    | 25.47     | 564          | 9.88    |
| 08/04/2014 23:15:33                    | 25.54     | 561          | 9.70    |
| 08/04/2014 23:30:33                    | 25.49     | 561          | 9.32    |
| 08/04/2014 23:45:33                    | 25.39     | 562          | 8.92    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/05/2014 00:00:33                    | 25.31     | 562          | 8.62    |
| 08/05/2014 00:15:33                    | 25.24     | 563          | 8.38    |
| 08/05/2014 00:30:33                    | 25.12     | 561          | 8.69    |
| 08/05/2014 00:45:33                    | 24.91     | 553          | 8.63    |
| 08/05/2014 01:00:33                    | 24.78     | 553          | 7.77    |
| 08/05/2014 01:15:33                    | 24.69     | 555          | 7.35    |
| 08/05/2014 01:30:33                    | 24.48     | 554          | 7.18    |
| 08/05/2014 01:45:33                    | 24.44     | 549          | 7.11    |
| 08/05/2014 02:00:33                    | 24.41     | 548          | 7.23    |
| 08/05/2014 02:15:33                    | 24.21     | 547          | 6.58    |
| 08/05/2014 02:30:33                    | 24.23     | 546          | 6.23    |
| 08/05/2014 02:45:33                    | 24.09     | 548          | 6.16    |
| 08/05/2014 03:00:33                    | 24.01     | 547          | 5.83    |
| 08/05/2014 03:15:33                    | 24.00     | 549          | 5.62    |
| 08/05/2014 03:30:33                    | 23.95     | 552          | 6.32    |
| 08/05/2014 03:45:33                    | 23.65     | 548          | 5.52    |
| 08/05/2014 04:00:33                    | 22.94     | 390          | 6.33    |
| 08/05/2014 04:15:33                    | 22.91     | 355          | 6.56    |
| 08/05/2014 04:30:33                    | 22.85     | 346          | 6.43    |
| 08/05/2014 04:45:33                    | 23.06     | 435          | 6.49    |
| 08/05/2014 05:00:33                    | 23.09     | 451          | 6.43    |
| 08/05/2014 05:15:33                    | 22.68     | 407          | 6.36    |
| 08/05/2014 05:30:33                    | 22.57     | 365          | 6.37    |
| 08/05/2014 05:45:33                    | 22.49     | 360          | 6.21    |
| 08/05/2014 06:00:33                    | 22.46     | 353          | 5.94    |
| 08/05/2014 06:15:33                    | 22.47     | 365          | 5.52    |
| 08/05/2014 06:30:33                    | 22.48     | 410          | 5.07    |
| 08/05/2014 06:45:33                    | 22.47     | 448          | 4.75    |
| 08/05/2014 07:00:33                    | 22.44     | 466          | 4.58    |
| 08/05/2014 07:15:33                    | 22.42     | 474          | 4.35    |
| 08/05/2014 07:30:33                    | 22.41     | 486          | 4.16    |
| 08/05/2014 07:45:33                    | 22.42     | 495          | 4.11    |
| 08/05/2014 08:00:33                    | 22.41     | 485          | 4.25    |
| 08/05/2014 08:15:33                    | 22.40     | 470          | 4.26    |
| 08/05/2014 08:30:33                    | 22.39     | 481          | 4.20    |
| 08/05/2014 08:45:33                    | 22.38     | 487          | 4.07    |
| 08/05/2014 09:00:33                    | 22.39     | 487          | 3.99    |
| 08/05/2014 09:15:33                    | 22.38     | 509          | 3.82    |
| 08/05/2014 09:30:33                    | 22.43     | 504          | 3.93    |
| 08/05/2014 09:45:33                    | 22.47     | 503          | 3.90    |
| 08/05/2014 10:00:33                    | 22.50     | 511          | 3.77    |
| 08/05/2014 10:15:33                    | 22.54     | 511          | 3.86    |
| 08/05/2014 10:30:33                    | 22.59     | 515          | 3.88    |
| 08/05/2014 10:45:33                    | 22.63     | 514          | 3.91    |



| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/05/2014 11:00:33                    | 22.71     | 510          | 4.29    |
| 08/05/2014 11:15:33                    | 22.89     | 507          | 4.87    |
| 08/05/2014 11:30:33                    | 22.87     | 507          | 4.80    |
| 08/05/2014 11:45:33                    | 22.92     | 510          | 5.12    |
| 08/05/2014 12:00:33                    | 22.90     | 511          | 5.20    |
| 08/05/2014 12:15:33                    | 22.91     | 508          | 5.17    |
| 08/05/2014 12:30:33                    | 23.03     | 504          | 5.14    |
| 08/05/2014 12:45:33                    | 23.11     | 503          | 5.69    |
| 08/05/2014 13:00:33                    | 23.20     | 502          | 5.89    |
| 08/05/2014 13:15:33                    | 23.36     | 500          | 6.35    |
| 08/05/2014 13:30:33                    | 23.53     | 500          | 6.96    |
| 08/05/2014 13:45:33                    | 23.59     | 498          | 7.22    |
| 08/05/2014 14:00:33                    | 23.90     | 496          | 7.91    |
| 08/05/2014 14:15:33                    | 23.93     | 496          | 8.33    |
| 08/05/2014 14:30:33                    | 23.95     | 497          | 7.88    |
| 08/05/2014 14:45:33                    | 23.98     | 498          | 7.89    |
| 08/05/2014 15:00:33                    | 24.08     | 498          | 7.94    |
| 08/05/2014 15:15:33                    | 24.44     | 499          | 8.52    |
| 08/05/2014 15:30:33                    | 24.39     | 499          | 8.56    |
| 08/05/2014 15:45:33                    | 24.42     | 499          | 8.61    |
| 08/05/2014 16:00:33                    | 24.39     | 499          | 8.61    |
| 08/05/2014 16:15:33                    | 24.47     | 501          | 8.44    |
| 08/05/2014 16:30:33                    | 24.48     | 502          | 8.41    |
| 08/05/2014 16:45:33                    | 24.54     | 505          | 8.28    |
| 08/05/2014 17:00:33                    | 24.61     | 507          | 8.20    |
| 08/05/2014 17:15:33                    | 24.60     | 509          | 8.01    |
| 08/05/2014 17:30:33                    | 24.67     | 510          | 8.00    |
| 08/05/2014 17:45:33                    | 24.67     | 510          | 8.02    |
| 08/05/2014 18:00:33                    | 24.74     | 510          | 8.07    |
| 08/05/2014 18:15:33                    | 24.82     | 511          | 8.27    |
| 08/05/2014 18:30:33                    | 24.75     | 511          | 8.37    |
| 08/05/2014 18:45:33                    | 24.81     | 512          | 8.45    |
| 08/05/2014 19:00:33                    | 24.80     | 512          | 8.26    |
| 08/05/2014 19:15:33                    | 24.88     | 512          | 8.20    |
| 08/05/2014 19:30:33                    | 24.88     | 514          | 8.25    |
| 08/05/2014 19:45:33                    | 24.83     | 514          | 8.24    |
| 08/05/2014 20:00:33                    | 24.84     | 513          | 8.07    |
| 08/05/2014 20:15:33                    | 24.90     | 513          | 7.85    |
| 08/05/2014 20:30:33                    | 24.91     | 514          | 7.86    |
| 08/05/2014 20:45:33                    | 24.90     | 515          | 7.82    |
| 08/05/2014 21:00:33                    | 24.94     | 515          | 7.87    |
| 08/05/2014 21:15:33                    | 24.92     | 515          | 7.72    |
| 08/05/2014 21:30:33                    | 24.96     | 515          | 7.77    |
| 08/05/2014 21:45:33                    | 24.96     | 517          | 8.13    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/05/2014 22:00:33                    | 25.02     | 519          | 8.17    |
| 08/05/2014 22:15:33                    | 25.00     | 520          | 7.86    |
| 08/05/2014 22:30:33                    | 25.05     | 523          | 7.74    |
| 08/05/2014 22:45:33                    | 25.04     | 526          | 7.96    |
| 08/05/2014 23:00:33                    | 25.06     | 531          | 8.02    |
| 08/05/2014 23:15:33                    | 25.07     | 540          | 7.97    |
| 08/05/2014 23:30:33                    | 24.99     | 547          | 7.62    |
| 08/05/2014 23:45:33                    | 24.91     | 551          | 7.31    |
| 08/06/2014 00:00:33                    | 24.83     | 553          | 7.04    |
| 08/06/2014 00:15:33                    | 24.76     | 554          | 6.94    |
| 08/06/2014 00:30:33                    | 24.66     | 555          | 6.62    |
| 08/06/2014 00:45:33                    | 24.58     | 558          | 6.09    |
| 08/06/2014 01:00:33                    | 24.49     | 559          | 5.96    |
| 08/06/2014 01:15:33                    | 24.42     | 557          | 6.06    |
| 08/06/2014 01:30:33                    | 24.34     | 556          | 5.98    |
| 08/06/2014 01:45:33                    | 24.24     | 561          | 5.40    |
| 08/06/2014 02:00:33                    | 24.17     | 561          | 5.41    |
| 08/06/2014 02:15:33                    | 24.07     | 564          | 4.83    |
| 08/06/2014 02:30:33                    | 24.04     | 565          | 4.46    |
| 08/06/2014 02:45:33                    | 23.89     | 568          | 4.17    |
| 08/06/2014 03:00:33                    | 23.94     | 564          | 4.33    |
| 08/06/2014 03:15:33                    | 23.77     | 566          | 3.86    |
| 08/06/2014 03:30:33                    | 23.68     | 569          | 3.62    |
| 08/06/2014 03:45:33                    | 23.62     | 569          | 3.46    |
| 08/06/2014 04:00:33                    | 23.51     | 571          | 3.42    |
| 08/06/2014 04:15:33                    | 23.45     | 570          | 3.18    |
| 08/06/2014 04:30:33                    | 23.37     | 571          | 2.91    |
| 08/06/2014 04:45:33                    | 23.29     | 572          | 2.87    |
| 08/06/2014 05:00:33                    | 23.27     | 571          | 3.43    |
| 08/06/2014 05:15:33                    | 23.26     | 569          | 2.96    |
| 08/06/2014 05:30:33                    | 23.18     | 569          | 2.92    |
| 08/06/2014 05:45:33                    | 23.02     | 571          | 2.84    |
| 08/06/2014 06:00:33                    | 22.98     | 570          | 3.00    |
| 08/06/2014 06:15:33                    | 22.95     | 571          | 2.65    |
| 08/06/2014 06:30:33                    | 22.85     | 573          | 2.97    |
| 08/06/2014 06:45:33                    | 22.84     | 572          | 3.12    |
| 08/06/2014 07:00:33                    | 22.87     | 571          | 2.86    |
| 08/06/2014 07:15:33                    | 22.78     | 573          | 2.82    |
| 08/06/2014 07:30:33                    | 22.77     | 573          | 2.81    |
| 08/06/2014 07:45:33                    | 22.79     | 573          | 2.63    |
| 08/06/2014 08:00:33                    | 22.71     | 575          | 2.67    |
| 08/06/2014 08:15:33                    | 22.77     | 574          | 2.93    |
| 08/06/2014 08:30:33                    | 22.82     | 570          | 2.89    |
| 08/06/2014 08:45:33                    | 22.72     | 571          | 2.73    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/06/2014 09:00:33                    | 22.75     | 573          | 2.77    |
| 08/06/2014 09:15:33                    | 22.71     | 575          | 2.73    |
| 08/06/2014 09:30:33                    | 22.76     | 574          | 2.81    |
| 08/06/2014 09:45:33                    | 22.81     | 574          | 2.78    |
| 08/06/2014 10:00:33                    | 22.87     | 574          | 3.14    |
| 08/06/2014 10:15:33                    | 22.91     | 573          | 3.47    |
| 08/06/2014 10:30:33                    | 22.92     | 573          | 3.85    |
| 08/06/2014 10:45:33                    | 23.02     | 572          | 4.24    |
| 08/06/2014 11:00:33                    | 23.02     | 572          | 4.24    |
| 08/06/2014 11:15:33                    | 23.09     | 571          | 4.52    |
| 08/06/2014 11:30:33                    | 23.13     | 571          | 4.90    |
| 08/06/2014 11:45:33                    | 23.22     | 569          | 5.04    |
| 08/06/2014 12:00:33                    | 23.26     | 568          | 5.73    |
| 08/06/2014 12:15:33                    | 23.30     | 568          | 5.34    |
| 08/06/2014 12:30:33                    | 23.38     | 568          | 5.64    |
| 08/06/2014 12:45:33                    | 23.38     | 567          | 5.68    |
| 08/06/2014 13:00:33                    | 23.50     | 565          | 6.19    |
| 08/06/2014 13:15:33                    | 23.67     | 564          | 6.75    |
| 08/06/2014 13:30:33                    | 23.87     | 561          | 7.71    |
| 08/06/2014 13:45:33                    | 24.01     | 557          | 8.51    |
| 08/06/2014 14:00:33                    | 23.98     | 553          | 8.64    |
| 08/06/2014 14:15:33                    | 24.17     | 549          | 9.37    |
| 08/06/2014 14:30:33                    | 24.30     | 546          | 9.33    |
| 08/06/2014 14:45:33                    | 24.43     | 547          | 9.67    |
| 08/06/2014 15:00:33                    | 24.70     | 544          | 9.54    |
| 08/06/2014 15:15:33                    | 25.00     | 545          | 10.25   |
| 08/06/2014 15:30:33                    | 25.19     | 548          | 10.22   |
| 08/06/2014 15:45:33                    | 25.50     | 548          | 10.46   |
| 08/06/2014 16:00:33                    | 25.55     | 549          | 11.83   |
| 08/06/2014 16:15:33                    | 25.53     | 548          | 10.77   |
| 08/06/2014 16:30:33                    | 25.67     | 549          | 10.78   |
| 08/06/2014 16:45:33                    | 25.72     | 549          | 10.68   |
| 08/06/2014 17:00:33                    | 25.64     | 549          | 11.18   |
| 08/06/2014 17:15:33                    | 25.72     | 548          | 11.14   |
| 08/06/2014 17:30:33                    | 25.75     | 547          | 11.08   |
| 08/06/2014 17:45:33                    | 25.76     | 545          | 11.24   |
| 08/06/2014 18:00:33                    | 25.78     | 547          | 10.81   |
| 08/06/2014 18:15:33                    | 25.75     | 547          | 10.87   |
| 08/06/2014 18:30:33                    | 25.78     | 546          | 10.99   |
| 08/06/2014 18:45:33                    | 25.76     | 547          | 10.96   |
| 08/06/2014 19:00:33                    | 25.84     | 546          | 10.98   |
| 08/06/2014 19:15:33                    | 25.73     | 548          | 10.75   |
| 08/06/2014 19:30:33                    | 25.77     | 547          | 10.71   |
| 08/06/2014 19:45:33                    | 25.76     | 547          | 10.73   |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/06/2014 20:00:33                    | 25.73     | 547          | 10.55   |
| 08/06/2014 20:15:33                    | 25.70     | 547          | 10.63   |
| 08/06/2014 20:30:33                    | 25.76     | 546          | 10.65   |
| 08/06/2014 20:45:33                    | 25.72     | 547          | 10.33   |
| 08/06/2014 21:00:33                    | 25.72     | 547          | 10.48   |
| 08/06/2014 21:15:33                    | 25.80     | 546          | 10.69   |
| 08/06/2014 21:30:33                    | 25.65     | 547          | 10.55   |
| 08/06/2014 21:45:33                    | 25.76     | 547          | 10.56   |
| 08/06/2014 22:00:33                    | 25.87     | 544          | 10.87   |
| 08/06/2014 22:15:33                    | 25.76     | 544          | 10.97   |
| 08/06/2014 22:30:33                    | 25.70     | 544          | 10.88   |
| 08/06/2014 22:45:33                    | 25.61     | 545          | 10.45   |
| 08/06/2014 23:00:33                    | 25.51     | 545          | 10.25   |
| 08/06/2014 23:15:33                    | 25.46     | 544          | 10.12   |
| 08/06/2014 23:30:33                    | 25.37     | 545          | 9.51    |
| 08/06/2014 23:45:33                    | 25.30     | 545          | 9.32    |
| 08/07/2014 00:00:33                    | 25.20     | 546          | 8.86    |
| 08/07/2014 00:15:33                    | 25.15     | 547          | 8.81    |
| 08/07/2014 00:30:33                    | 24.98     | 551          | 8.21    |
| 08/07/2014 00:45:33                    | 25.07     | 548          | 8.34    |
| 08/07/2014 01:00:33                    | 24.90     | 550          | 8.32    |
| 08/07/2014 01:15:33                    | 24.94     | 549          | 8.15    |
| 08/07/2014 01:30:33                    | 24.80     | 552          | 7.30    |
| 08/07/2014 01:45:33                    | 24.75     | 554          | 7.06    |
| 08/07/2014 02:00:33                    | 24.66     | 556          | 6.82    |
| 08/07/2014 02:15:33                    | 24.62     | 557          | 6.43    |
| 08/07/2014 02:30:33                    | 24.47     | 558          | 6.53    |
| 08/07/2014 02:45:33                    | 24.31     | 562          | 5.71    |
| 08/07/2014 03:00:33                    | 24.25     | 565          | 5.57    |
| 08/07/2014 03:15:33                    | 24.34     | 563          | 5.30    |
| 08/07/2014 03:30:33                    | 24.26     | 563          | 5.06    |
| 08/07/2014 03:45:33                    | 24.16     | 566          | 4.25    |
| 08/07/2014 04:00:33                    | 24.10     | 566          | 4.34    |
| 08/07/2014 04:15:33                    | 24.05     | 567          | 4.63    |
| 08/07/2014 04:30:33                    | 24.04     | 566          | 4.98    |
| 08/07/2014 04:45:33                    | 24.01     | 566          | 4.33    |
| 08/07/2014 05:00:33                    | 23.95     | 567          | 3.80    |
| 08/07/2014 05:15:33                    | 23.90     | 568          | 3.70    |
| 08/07/2014 05:30:33                    | 23.89     | 568          | 3.34    |
| 08/07/2014 05:45:33                    | 23.82     | 569          | 3.26    |
| 08/07/2014 06:00:33                    | 23.77     | 570          | 3.13    |
| 08/07/2014 06:15:33                    | 23.72     | 570          | 3.35    |
| 08/07/2014 06:30:33                    | 23.66     | 571          | 3.19    |
| 08/07/2014 06:45:33                    | 23.66     | 570          | 3.12    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/07/2014 07:00:33                    | 23.59     | 570          | 3.23    |
| 08/07/2014 07:15:33                    | 23.41     | 567          | 3.72    |
| 08/07/2014 07:30:33                    | 23.05     | 552          | 4.20    |
| 08/07/2014 07:45:33                    | 22.61     | 302          | 6.52    |
| 08/07/2014 08:00:33                    | 22.43     | 153          | 7.19    |
| 08/07/2014 08:15:33                    | 22.30     | 93           | 7.38    |
| 08/07/2014 08:30:33                    | 22.38     | 144          | 7.23    |
| 08/07/2014 08:45:33                    | 22.48     | 350          | 6.59    |
| 08/07/2014 09:00:33                    | 23.11     | 455          | 6.04    |
| 08/07/2014 09:15:33                    | 24.16     | 525          | 5.94    |
| 08/07/2014 09:30:33                    | 24.00     | 545          | 6.06    |
| 08/07/2014 09:45:33                    | 23.97     | 561          | 6.19    |
| 08/07/2014 10:00:33                    | 24.02     | 561          | 6.32    |
| 08/07/2014 10:15:33                    | 24.04     | 547          | 6.48    |
| 08/07/2014 10:30:33                    | 24.09     | 521          | 6.65    |
| 08/07/2014 10:45:33                    | 24.05     | 502          | 6.69    |
| 08/07/2014 11:00:33                    | 23.98     | 483          | 6.74    |
| 08/07/2014 11:15:33                    | 23.90     | 458          | 6.75    |
| 08/07/2014 11:30:33                    | 23.80     | 429          | 6.80    |
| 08/07/2014 11:45:33                    | 23.68     | 393          | 6.93    |
| 08/07/2014 12:00:33                    | 23.54     | 353          | 6.98    |
| 08/07/2014 12:15:33                    | 23.40     | 309          | 6.98    |
| 08/07/2014 12:30:33                    | 23.29     | 273          | 7.01    |
| 08/07/2014 12:45:33                    | 23.25     | 257          | 7.02    |
| 08/07/2014 13:00:33                    | 23.40     | 293          | 6.97    |
| 08/07/2014 13:15:33                    | 23.68     | 428          | 7.05    |
| 08/07/2014 13:30:33                    | 23.54     | 452          | 7.17    |
| 08/07/2014 13:45:33                    | 23.27     | 453          | 7.22    |
| 08/07/2014 14:00:33                    | 23.08     | 445          | 7.27    |
| 08/07/2014 14:15:33                    | 22.96     | 444          | 7.33    |
| 08/07/2014 14:30:33                    | 22.88     | 456          | 7.37    |
| 08/07/2014 14:45:33                    | 22.86     | 481          | 7.41    |
| 08/07/2014 15:00:33                    | 22.87     | 506          | 7.45    |
| 08/07/2014 15:15:33                    | 22.87     | 514          | 7.49    |
| 08/07/2014 15:30:33                    | 22.88     | 503          | 7.51    |
| 08/07/2014 15:45:33                    | 22.90     | 477          | 7.54    |
| 08/07/2014 16:00:33                    | 22.89     | 444          | 7.55    |
| 08/07/2014 16:15:33                    | 22.88     | 411          | 7.55    |
| 08/07/2014 16:30:33                    | 22.90     | 381          | 7.54    |
| 08/07/2014 16:45:33                    | 22.89     | 356          | 7.54    |
| 08/07/2014 17:00:33                    | 22.87     | 336          | 7.52    |
| 08/07/2014 17:15:33                    | 22.85     | 321          | 7.51    |
| 08/07/2014 17:30:33                    | 22.83     | 312          | 7.49    |
| 08/07/2014 17:45:33                    | 22.83     | 307          | 7.46    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/07/2014 18:00:33                    | 22.82     | 304          | 7.45    |
| 08/07/2014 18:15:33                    | 22.82     | 304          | 7.43    |
| 08/07/2014 18:30:33                    | 22.81     | 305          | 7.41    |
| 08/07/2014 18:45:33                    | 22.81     | 308          | 7.40    |
| 08/07/2014 19:00:33                    | 22.81     | 309          | 7.38    |
| 08/07/2014 19:15:33                    | 22.83     | 310          | 7.38    |
| 08/07/2014 19:30:33                    | 22.81     | 311          | 7.37    |
| 08/07/2014 19:45:33                    | 22.80     | 312          | 7.35    |
| 08/07/2014 20:00:33                    | 22.80     | 313          | 7.33    |
| 08/07/2014 20:15:33                    | 22.80     | 312          | 7.31    |
| 08/07/2014 20:30:33                    | 22.80     | 311          | 7.29    |
| 08/07/2014 20:45:33                    | 22.80     | 311          | 7.26    |
| 08/07/2014 21:00:33                    | 22.78     | 312          | 7.24    |
| 08/07/2014 21:15:33                    | 22.77     | 313          | 7.22    |
| 08/07/2014 21:30:33                    | 22.75     | 314          | 7.19    |
| 08/07/2014 21:45:33                    | 22.73     | 315          | 7.18    |
| 08/07/2014 22:00:33                    | 22.71     | 316          | 7.16    |
| 08/07/2014 22:15:33                    | 22.69     | 317          | 7.14    |
| 08/07/2014 22:30:33                    | 22.67     | 318          | 7.13    |
| 08/07/2014 22:45:33                    | 22.64     | 319          | 7.11    |
| 08/07/2014 23:00:33                    | 22.63     | 319          | 7.10    |
| 08/07/2014 23:15:33                    | 22.61     | 320          | 7.09    |
| 08/07/2014 23:30:33                    | 22.60     | 320          | 7.08    |
| 08/07/2014 23:45:33                    | 22.59     | 321          | 7.06    |
| 08/08/2014 00:00:33                    | 22.58     | 321          | 7.05    |
| 08/08/2014 00:15:33                    | 22.57     | 321          | 7.05    |
| 08/08/2014 00:30:33                    | 22.56     | 322          | 7.04    |
| 08/08/2014 00:45:33                    | 22.55     | 322          | 7.04    |
| 08/08/2014 01:00:33                    | 22.54     | 323          | 7.04    |
| 08/08/2014 01:15:33                    | 22.53     | 324          | 7.04    |
| 08/08/2014 01:30:33                    | 22.53     | 326          | 7.03    |
| 08/08/2014 01:45:33                    | 22.52     | 327          | 7.02    |
| 08/08/2014 02:00:33                    | 22.51     | 329          | 7.01    |
| 08/08/2014 02:15:33                    | 22.50     | 331          | 7.00    |
| 08/08/2014 02:30:33                    | 22.49     | 333          | 6.98    |
| 08/08/2014 02:45:33                    | 22.49     | 335          | 6.97    |
| 08/08/2014 03:00:33                    | 22.48     | 337          | 6.96    |
| 08/08/2014 03:15:33                    | 22.47     | 340          | 6.94    |
| 08/08/2014 03:30:33                    | 22.47     | 342          | 6.92    |
| 08/08/2014 03:45:33                    | 22.46     | 344          | 6.91    |
| 08/08/2014 04:00:33                    | 22.46     | 346          | 6.89    |
| 08/08/2014 04:15:33                    | 22.45     | 348          | 6.87    |
| 08/08/2014 04:30:33                    | 22.44     | 350          | 6.87    |
| 08/08/2014 04:45:33                    | 22.44     | 352          | 6.85    |

| Station #3 Date Time M/D/Y<br>HH:MM:SS | Temp<br>C | SpCond<br>uS | DO mg/L |
|----------------------------------------|-----------|--------------|---------|
| 08/08/2014 05:00:33                    | 22.43     | 354          | 6.83    |
| 08/08/2014 05:15:33                    | 22.43     | 355          | 6.81    |
| 08/08/2014 05:30:33                    | 22.43     | 357          | 6.79    |
| 08/08/2014 05:45:33                    | 22.42     | 359          | 6.77    |
| 08/08/2014 06:00:33                    | 22.42     | 360          | 6.76    |
| 08/08/2014 06:15:33                    | 22.42     | 362          | 6.74    |
| 08/08/2014 06:30:33                    | 22.42     | 363          | 6.73    |
| 08/08/2014 06:45:33                    | 22.42     | 365          | 6.72    |
| 08/08/2014 07:00:33                    | 22.42     | 367          | 6.70    |
| 08/08/2014 07:15:33                    | 22.43     | 368          | 6.69    |
| 08/08/2014 07:30:33                    | 22.44     | 370          | 6.68    |
| 08/08/2014 07:45:33                    | 22.45     | 371          | 6.66    |
| 08/08/2014 08:00:33                    | 22.46     | 372          | 6.66    |
| 08/08/2014 08:15:33                    | 22.48     | 374          | 6.66    |
| 08/08/2014 08:30:33                    | 22.50     | 375          | 6.65    |
| 08/08/2014 08:45:33                    | 22.53     | 377          | 6.66    |
| 08/08/2014 09:00:33                    | 22.55     | 378          | 6.66    |
| 08/08/2014 09:15:33                    | 22.57     | 379          | 6.65    |
| 08/08/2014 09:30:33                    | 22.61     | 381          | 6.65    |
| 08/08/2014 09:45:33                    | 22.65     | 382          | 6.66    |
| 08/08/2014 10:00:33                    | 22.71     | 383          | 6.70    |
| 08/08/2014 10:15:33                    | 22.79     | 385          | 6.72    |
| 08/08/2014 10:30:33                    | 22.88     | 386          | 6.76    |
| 08/08/2014 10:45:33                    | 22.98     | 387          | 6.79    |
| 08/08/2014 11:00:33                    | 23.09     | 388          | 6.82    |
| 08/08/2014 11:15:33                    | 23.22     | 390          | 6.86    |
| 08/08/2014 11:30:33                    | 23.32     | 391          | 6.89    |
| 08/08/2014 11:45:33                    | 23.44     | 392          | 6.93    |
| 08/08/2014 12:00:33                    | 23.57     | 393          | 6.96    |
| 08/08/2014 12:15:33                    | 23.74     | 395          | 7.02    |

## Appendix C

### Macroinvertebrate Bench Sheets



**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14910], Station #1, Sample Date: 9/23/2014 1:15:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>       | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|--------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>     |           |           |           |
| Acarina                  | 4         | 8         | 12        |
| <b>AMPHIPODA</b>         |           |           |           |
| Hyaella azteca           |           |           | 19        |
| <b>ARHYNCHOBDELLIDA</b>  |           |           |           |
| Erpobdellidae            | 2         |           | 1         |
| <b>BASOMMATOPHORA</b>    |           |           |           |
| Ancylidae                |           |           | 2         |
| Menetus                  |           |           | 33        |
| Physella                 |           | 2         |           |
| <b>BRANCHIOBDELLIDA</b>  |           |           |           |
| Branchiobdellida         |           |           | 2         |
| <b>COLEOPTERA</b>        |           |           |           |
| Berosus                  | 9         | 9         | 8         |
| Dubiraphia               | 1         | 1         | 23        |
| Stenelmis                | 250       | 107       | 9         |
| <b>DECAPODA</b>          |           |           |           |
| Orconectes luteus        | -99       | -99       |           |
| Orconectes virilis       |           |           | 1         |
| Palaemonetes kadiakensis |           |           | -99       |
| <b>DIPTERA</b>           |           |           |           |
| Ablabesmyia              | 2         | 36        | 6         |
| Axarus                   | 1         |           |           |
| Ceratopogoninae          | 1         | 3         |           |
| Chironomus               | 1         | 1         |           |
| Chrysops                 |           | 1         |           |
| Cladotanytarsus          | 9         | 12        | 1         |
| Corynoneura              | 2         | 2         | 1         |
| Cricotopus bicinctus     | 2         |           |           |
| Cricotopus/Orthocladius  | 11        | 2         |           |
| Cryptochironomus         | 4         | 8         |           |
| Dicrotendipes            |           | 4         |           |
| Diptera                  |           | 1         |           |
| Eukiefferiella           | 1         |           |           |
| Glyptotendipes           | 1         | 2         | 1         |
| Gonomyia                 |           | 1         |           |
| Hemerodromia             | 2         |           |           |
| Labrundinia              | 1         | 1         | 7         |
| Microtendipes            | 1         |           |           |
| Nilotanypus              | 1         |           |           |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14910], Station #1, Sample Date: 9/23/2014 1:15:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| ORDER: TAXA                | CS  | NF | RM  |
|----------------------------|-----|----|-----|
| Ormosia                    | 1   | 1  |     |
| Paratanytarsus             |     | 1  | 16  |
| Paratendipes               |     | 4  |     |
| Pentaneura                 | 2   |    |     |
| Phaenopsectra              |     | 1  | 1   |
| Polypedilum flavum         | 48  |    |     |
| Polypedilum halterale grp  | 2   | 2  |     |
| Polypedilum illinoense grp | 2   |    | 2   |
| Polypedilum scalaenum grp  | 15  | 6  |     |
| Pseudochironomus           |     | 1  |     |
| Rheotanytarsus             | 3   |    | 5   |
| Simulium                   | 1   |    |     |
| Stempellinella             |     | 1  | 1   |
| Stictochironomus           | 2   |    |     |
| Tabanus                    | -99 |    |     |
| Tanytarsus                 | 14  | 10 | 10  |
| Thienemanniella            | 1   |    |     |
| Thienemannimyia grp.       | 5   | 1  | 9   |
| Zavrelimyia                | 1   |    |     |
| <b>EPHEMEROPTERA</b>       |     |    |     |
| Acerpenna                  | 22  |    | 1   |
| Baetis                     | 107 |    |     |
| Caenis latipennis          | 8   | 24 | 50  |
| Procloeon                  |     | 1  |     |
| Stenacron                  | 3   | 1  | 2   |
| Stenonema femoratum        | 12  | 15 |     |
| Tricorythodes              | 65  | 5  | 27  |
| <b>HEMIPTERA</b>           |     |    |     |
| Rhagovelia                 | 1   |    |     |
| <b>LUMBRICINA</b>          |     |    |     |
| Lumbricina                 | 2   |    |     |
| <b>ODONATA</b>             |     |    |     |
| Argia                      | 2   | 1  | 22  |
| Basiaeschna janata         |     |    | -99 |
| Enallagma                  |     |    | 58  |
| Epithea (Epicordulia)      |     |    | 1   |
| Hetaerina                  |     |    | 5   |
| Somatochlora               |     |    | -99 |
| <b>TRICHOPTERA</b>         |     |    |     |
| Cheumatopsyche             | 91  |    | 2   |
| Chimarra                   | 4   |    |     |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14910], Station #1, Sample Date: 9/23/2014 1:15:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>       | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|--------------------------|-----------|-----------|-----------|
| Oecetis                  | 16        | 2         | 1         |
| Triaenodes               |           |           | 1         |
| <b>TRICLADIDA</b>        |           |           |           |
| Planariidae              |           |           | 1         |
| <b>TUBIFICIDA</b>        |           |           |           |
| Branchiura sowerbyi      | 11        | 18        |           |
| Limnodrilus hoffmeisteri |           | 1         |           |
| Tubificidae              | 41        | 47        |           |
| <b>VENEROIDA</b>         |           |           |           |
| Corbicula                | 8         | 4         |           |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14911], Station #2, Sample Date: 9/23/2014 3:15:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>      | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|-------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>    |           |           |           |
| Acarina                 | 1         | 10        | 5         |
| <b>AMPHIPODA</b>        |           |           |           |
| Gammarus                |           | 1         | -99       |
| <b>BASOMMATOPHORA</b>   |           |           |           |
| Ancylidae               | 1         |           | 4         |
| Lymnaeidae              |           |           | 1         |
| Menetus                 |           |           | 6         |
| Physella                |           |           | 1         |
| <b>BRANCHIOBDELLIDA</b> |           |           |           |
| Branchiobdellida        |           |           | 3         |
| <b>COLEOPTERA</b>       |           |           |           |
| Berosus                 | 2         | 2         | 10        |
| Dubiraphia              |           | 1         | 5         |
| Scirtidae               |           |           | 1         |
| Stenelmis               | 116       | 26        | 27        |
| <b>DECAPODA</b>         |           |           |           |
| Orconectes virilis      |           |           | -99       |
| <b>DIPTERA</b>          |           |           |           |
| Ablabesmyia             | 1         | 24        | 1         |
| Ceratopogoninae         | 1         | 12        |           |
| Cladotanytarsus         | 1         | 43        |           |
| Cricotopus bicinctus    | 2         |           | 1         |
| Cricotopus/Orthocladius | 17        | 6         | 3         |
| Cryptochironomus        | 1         | 6         |           |
| Demicryptochironomus    | 1         |           |           |
| Dicrotendipes           |           | 4         | 1         |
| Endochironomus          | 1         |           |           |
| Ephydriidae             | 1         | 1         |           |
| Eukiefferiella          | 1         |           |           |
| Labrundinia             |           | 2         | 7         |
| Microtendipes           |           | 2         |           |
| Nanocladius             |           | 1         |           |
| Nilotanypus             | 3         |           | 1         |
| Paracladopelma          | 1         |           |           |
| Parametrioconemus       | 1         |           |           |
| Paratanytarsus          | 1         | 2         | 3         |
| Paratendipes            |           | 3         |           |
| Pentaneura              | 2         |           |           |
| Polypedilum flavum      | 147       |           | 7         |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14911], Station #2, Sample Date: 9/23/2014 3:15:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| ORDER: TAXA                | CS  | NF | RM  |
|----------------------------|-----|----|-----|
| Polypedilum halterale grp  |     | 2  |     |
| Polypedilum illinoense grp |     | 1  | 1   |
| Polypedilum scalaenum grp  | 7   | 31 |     |
| Pseudochironomus           |     | 2  |     |
| Rheocricotopus             |     |    | 1   |
| Rheotanytarsus             | 5   |    | 5   |
| Simulium                   | 5   |    |     |
| Stempellinella             |     | 3  | 1   |
| Stictochironomus           |     | 2  |     |
| Tabanus                    | 7   |    |     |
| Tanytarsus                 | 8   | 44 | 21  |
| Thienemanniella            | 1   |    |     |
| Thienemannimyia grp.       | 11  | 4  | 11  |
| <b>EPHEMEROPTERA</b>       |     |    |     |
| Acentrella                 | 6   |    |     |
| Acerpenna                  | 13  |    |     |
| Baetis                     | 103 |    | 9   |
| Caenis latipennis          | 42  | 65 | 103 |
| Procloeon                  |     | 7  |     |
| Stenonema femoratum        | 19  | 18 | 2   |
| Tricorythodes              | 2   |    | 9   |
| <b>HEMIPTERA</b>           |     |    |     |
| Belostoma                  | -99 |    |     |
| Trepobates                 |     | 1  |     |
| <b>LUMBRICINA</b>          |     |    |     |
| Lumbricina                 | 15  |    |     |
| <b>ODONATA</b>             |     |    |     |
| Aeshnidae                  |     |    | -99 |
| Argia                      |     |    | 12  |
| Calopteryx                 |     |    | 1   |
| Enallagma                  |     |    | 34  |
| Hagenius brevistylus       |     |    | 1   |
| Hetaerina                  |     |    | 4   |
| Libellula                  |     |    | -99 |
| Progomphus obscurus        |     | 1  |     |
| <b>TRICHOPTERA</b>         |     |    |     |
| Cheumatopsyche             | 73  |    | 35  |
| Chimarra                   | 5   |    | 1   |
| Helicopsyche               | 3   |    |     |
| Oecetis                    | 5   |    | 9   |
| Triaenodes                 |     |    | 3   |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14911], Station #2, Sample Date: 9/23/2014 3:15:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>  | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|---------------------|-----------|-----------|-----------|
| TRICLADIDA          |           |           |           |
| Planariidae         |           |           | 3         |
| TUBIFICIDA          |           |           |           |
| Branchiura sowerbyi | 1         |           |           |
| Enchytraeidae       |           | 1         |           |
| Tubificidae         | 10        | 5         | 1         |
| VENEROIDA           |           |           |           |
| Corbicula           | 6         | 2         | 2         |
| Pisidiidae          |           | 1         | 9         |

# **Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [14912], Station #3, Sample Date: 9/24/2014 8:30:00 AM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>        | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|---------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>      |           |           |           |
| Acarina                   |           | 1         | 2         |
| <b>AMPHIPODA</b>          |           |           |           |
| Crangonyx                 |           |           | -99       |
| <b>BASOMMATOPHORA</b>     |           |           |           |
| Ancylidae                 | 4         |           | 2         |
| Menetus                   |           |           | 2         |
| Physella                  | 2         |           | 1         |
| <b>COLEOPTERA</b>         |           |           |           |
| Berosus                   | 12        | 3         | 25        |
| Dubiraphia                |           |           | 1         |
| Dytiscidae                |           |           | 1         |
| Helichus lithophilus      |           | 1         |           |
| Peltodytes                |           | 1         |           |
| Psephenus herricki        | 1         |           |           |
| Scirtidae                 |           |           | 1         |
| Stenelmis                 | 159       | 26        | 9         |
| <b>DIPTERA</b>            |           |           |           |
| Ablabesmyia               |           | 24        | 14        |
| Ceratopogoninae           |           | 4         |           |
| Chironomus                | 1         | 2         |           |
| Cladotanytarsus           | 1         | 5         | 1         |
| Corynoneura               | 4         |           |           |
| Cricotopus bicinctus      | 2         |           |           |
| Cricotopus/Orthocladius   | 9         | 3         | 1         |
| Cryptochironomus          |           | 1         |           |
| Demicryptochironomus      | 1         |           |           |
| Dicrotendipes             |           | 8         | 2         |
| Eukiefferiella            | 1         |           |           |
| Labrundinia               |           |           | 11        |
| Larsia                    |           |           | 1         |
| Microtendipes             | 2         | 2         |           |
| Nilotanypus               | 4         |           | 1         |
| Paracladopelma            |           | 1         |           |
| Paratanytarsus            |           | 1         | 5         |
| Paratendipes              |           | 8         | 2         |
| Pentaneura                | 1         |           |           |
| Phaenopsectra             |           |           | 2         |
| Polypedilum flavum        | 67        |           | 1         |
| Polypedilum halterale grp |           | 1         |           |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14912], Station #3, Sample Date: 9/24/2014 8:30:00 AM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>         | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|----------------------------|-----------|-----------|-----------|
| Polypedilum illinoense grp |           | 1         |           |
| Polypedilum scalaenum grp  | 9         | 7         | 6         |
| Pseudochironomus           |           | 1         |           |
| Rheocricotopus             | 1         |           |           |
| Rheotanytarsus             | 11        |           |           |
| Simulium                   | 2         |           |           |
| Stempellinella             | 3         | 4         |           |
| Stictochironomus           |           | 1         |           |
| Tabanus                    | 1         |           |           |
| Tanytarsus                 | 14        | 25        | 14        |
| Thienemanniella            | 2         |           | 1         |
| Thienemannimyia grp.       | 13        | 4         | 10        |
| <b>EPHEMEROPTERA</b>       |           |           |           |
| Acerpenna                  | 12        |           |           |
| Baetis                     | 126       | 2         |           |
| Caenis latipennis          | 63        | 72        | 103       |
| Centroptilum               |           | 14        | 1         |
| Stenacron                  | 1         | 1         |           |
| Stenonema femoratum        | 26        | 41        | 3         |
| Tricorythodes              | 2         |           | 3         |
| <b>ISOPODA</b>             |           |           |           |
| Caecidotea                 | 1         |           |           |
| <b>LUMBRICINA</b>          |           |           |           |
| Lumbricina                 | 2         | 1         |           |
| <b>ODONATA</b>             |           |           |           |
| Argia                      | 4         | -99       | 12        |
| Basiaeschna janata         |           |           | 1         |
| Calopteryx                 |           |           | 1         |
| Enallagma                  |           |           | 68        |
| Hagenius brevistylus       |           | 1         | -99       |
| Hetaerina                  |           |           | 1         |
| Libellula                  |           |           | 1         |
| Macromia                   |           |           | 1         |
| Progomphus obscurus        |           | 1         |           |
| <b>TRICHOPTERA</b>         |           |           |           |
| Cheumatopsyche             | 123       |           |           |
| Chimarra                   | 37        |           |           |
| Hydropsyche                | 1         |           |           |
| Marilia                    | 6         |           |           |
| Polycentropus              |           | 2         |           |
| Triaenodes                 |           |           | 1         |



**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14912], Station #3, Sample Date: 9/24/2014 8:30:00 AM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>       | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|--------------------------|-----------|-----------|-----------|
| TRICLADIDA               |           |           |           |
| Planariidae              | 1         |           |           |
| TUBIFICIDA               |           |           |           |
| Branchiura sowerbyi      | 5         | 4         |           |
| Limnodrilus hoffmeisteri |           |           | 1         |
| Tubificidae              | 23        | 10        | 4         |
| VENEROIDA                |           |           |           |
| Corbicula                | 4         | 2         | -99       |
| Pisidiidae               | 3         |           |           |

**Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [14913], Station #4, Sample Date: 9/24/2014 10:30:00 AM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>       | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|--------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>     |           |           |           |
| Acarina                  |           | 1         | 10        |
| <b>AMPHIPODA</b>         |           |           |           |
| Crangonyx                |           | 2         |           |
| Hyaella azteca           |           |           | 6         |
| <b>ARHYNCHOBDELLIDA</b>  |           |           |           |
| Erpobdellidae            | 1         |           |           |
| <b>BASOMMATOPHORA</b>    |           |           |           |
| Lymnaeidae               | 1         |           | 3         |
| Menetus                  |           |           | 2         |
| Physella                 |           |           | 6         |
| <b>BRANCHIOBDELLIDA</b>  |           |           |           |
| Branchiobdellida         |           | 1         |           |
| <b>COLEOPTERA</b>        |           |           |           |
| Berosus                  | 1         | 9         | 13        |
| Dubiraphia               |           |           | 3         |
| Psephenus herricki       |           | -99       |           |
| Stenelmis                | 11        | 8         | 17        |
| <b>DECAPODA</b>          |           |           |           |
| Orconectes luteus        |           | -99       |           |
| Orconectes virilis       |           |           | -99       |
| Palaemonetes kadiakensis |           |           | -99       |
| <b>DIPTERA</b>           |           |           |           |
| Ablabesmyia              | 2         | 27        | 19        |
| Ceratopogoninae          | 1         | 1         |           |
| Chironomus               |           | 4         |           |
| Chrysops                 |           | -99       |           |
| Cladotanytarsus          |           | 14        | 1         |
| Corynoneura              | 5         |           | 1         |
| Cricotopus/Orthocladius  | 17        | 3         | 4         |
| Cryptochironomus         |           | 3         |           |
| Demicryptochironomus     | 1         |           |           |
| Dicrotendipes            |           | 8         | 7         |
| Glyptotendipes           |           |           | 1         |
| Labrundinia              |           | 1         | 8         |
| Larsia                   |           | 1         |           |
| Microtendipes            |           | 1         |           |
| Nanocladius              |           |           | 1         |
| Ormosia                  |           | 6         |           |
| Paracladopelma           |           | 1         |           |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14913], Station #4, Sample Date: 9/24/2014 10:30:00 AM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>         | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|----------------------------|-----------|-----------|-----------|
| Paraphaenocladus           |           | 1         |           |
| Paratanytarsus             | 2         |           | 14        |
| Paratendipes               |           | 4         | 1         |
| Pentaneura                 | 5         |           |           |
| Phaenopsectra              |           |           | 1         |
| Polypedilum flavum         | 15        |           |           |
| Polypedilum halterale grp  |           | 1         |           |
| Polypedilum illinoense grp | 1         | 1         |           |
| Polypedilum scalaenum grp  | 2         | 11        | 1         |
| Rheotanytarsus             | 5         |           | 1         |
| Simulium                   | 1         |           |           |
| Stempellinella             |           | 4         |           |
| Tanytarsus                 | 16        | 22        | 26        |
| Thienemanniella            | 4         |           |           |
| Thienemannimyia grp.       | 9         | 4         | 6         |
| undescribed Empididae      | 2         | 1         |           |
| Zavrelimyia                |           | 1         |           |
| <b>EPHEMEROPTERA</b>       |           |           |           |
| Baetis                     | 88        |           |           |
| Caenis latipennis          | 100       | 131       |           |
| Callibaetis                |           |           | 2         |
| Centroptilum               |           |           | 1         |
| Procloeon                  |           | 2         |           |
| Stenacron                  | 1         | 1         |           |
| Stenonema femoratum        | 3         | 13        |           |
| <b>HEMIPTERA</b>           |           |           |           |
| Microvelia                 | 1         |           | 1         |
| Rhagovelia                 | 10        |           |           |
| <b>LUMBRICINA</b>          |           |           |           |
| Lumbricina                 |           | -99       |           |
| <b>ODONATA</b>             |           |           |           |
| Argia                      | 1         | 4         | 17        |
| Calopteryx                 | 1         | -99       | 2         |
| Enallagma                  | 1         |           | 80        |
| Erythemis                  |           |           | -99       |
| Hetaerina                  |           |           | 1         |
| Libellula                  |           | -99       |           |
| <b>RHYNCHOBDELLIDA</b>     |           |           |           |
| Glossiphoniidae            |           | 1         |           |
| <b>TRICHOPTERA</b>         |           |           |           |
| Cheumatopsyche             | 66        |           |           |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14913], Station #4, Sample Date: 9/24/2014 10:30:00 AM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>  | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|---------------------|-----------|-----------|-----------|
| Oecetis             |           |           | 1         |
| TRICLADIDA          |           |           |           |
| Planariidae         |           | 1         | 1         |
| TUBIFICIDA          |           |           |           |
| Branchiura sowerbyi |           | 2         |           |
| Enchytraeidae       |           | 1         | 1         |
| Tubificidae         | 1         | 27        |           |

**Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [14915], Station #5, Sample Date: 9/24/2014 2:45:00 PM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>      | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|-------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>    |           |           |           |
| Acarina                 |           | 2         | 6         |
| <b>AMPHIPODA</b>        |           |           |           |
| Crangonyx               |           | 3         |           |
| Hyaella azteca          |           |           | 19        |
| <b>ARHYNCHOBDELLIDA</b> |           |           |           |
| Erpobdellidae           |           |           | -99       |
| <b>BASOMMATOPHORA</b>   |           |           |           |
| Ancylidae               | 1         | 2         |           |
| Gyraulus                |           |           | 4         |
| Helisoma                |           | -99       | 8         |
| Lymnaeidae              |           | 1         | 1         |
| Menetus                 |           |           | 6         |
| Physella                | 1         | 4         | 9         |
| <b>COLEOPTERA</b>       |           |           |           |
| Berosus                 | 1         | 2         | 6         |
| Dubiraphia              |           | 6         | 34        |
| Helichus lithophilus    |           | 1         |           |
| Hydrophilidae           |           |           | 1         |
| Psephenus herricki      | -99       |           |           |
| Stenelmis               | 248       | 54        | 8         |
| <b>DECAPODA</b>         |           |           |           |
| Orconectes              |           |           | -99       |
| <b>DIPTERA</b>          |           |           |           |
| Ablabesmyia             |           | 29        |           |
| Ceratopogoninae         | 1         | 4         |           |
| Chironomidae            | 3         | 3         | 1         |
| Chironomus              |           | 1         |           |
| Cladotanytarsus         |           | 6         |           |
| Corynoneura             | 10        | 1         |           |
| Cricotopus bicinctus    |           | 1         |           |
| Cricotopus/Orthocladius | 8         | 11        | 3         |
| Cryptochironomus        |           | 12        |           |
| Dicrotendipes           |           | 1         | 1         |
| Ephydriidae             |           | 1         |           |
| Forcipomyiinae          |           |           | 1         |
| Labrundinia             |           |           | 9         |
| Microtendipes           |           | 5         | 3         |
| Nanocladius             |           |           | 1         |
| Nilotanypus             | 2         | 2         | 2         |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14915], Station #5, Sample Date: 9/24/2014 2:45:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>         | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|----------------------------|-----------|-----------|-----------|
| Paracladopelma             |           | 3         |           |
| Parametriocnemus           | 1         |           |           |
| Paratanytarsus             | 1         | 10        | 19        |
| Paratendipes               |           | 4         |           |
| Polypedilum flavum         | 17        |           | 2         |
| Polypedilum halterale grp  |           | 6         |           |
| Polypedilum illinoense grp | 5         |           |           |
| Polypedilum scalaenum grp  |           | 17        | 1         |
| Rheotanytarsus             | 12        | 2         | 18        |
| Simulium                   | 5         |           |           |
| Stempellinella             |           | 1         | 1         |
| Stenochironomus            |           |           | 2         |
| Stictochironomus           |           | 7         | 1         |
| Tanytarsus                 | 2         | 26        | 14        |
| Thienemanniella            | 3         |           | 1         |
| Thienemannimyia grp.       | 10        | 2         | 15        |
| Zavrelimyia                |           | 2         |           |
| <b>EPHEMEROPTERA</b>       |           |           |           |
| Baetis                     | 94        | 1         | 1         |
| Caenis latipennis          | 2         | 70        | 1         |
| Procloeon                  |           | 1         |           |
| Stenonema femoratum        |           | 10        |           |
| <b>HEMIPTERA</b>           |           |           |           |
| Microvelia                 |           | 1         |           |
| Rhagovelia                 | 1         |           |           |
| <b>ODONATA</b>             |           |           |           |
| Argia                      |           |           | 18        |
| Basiaeschna janata         |           |           | -99       |
| Calopteryx                 |           |           | 2         |
| Enallagma                  |           | 2         | 95        |
| Epithea (Epicordulia)      |           |           | -99       |
| Progomphus obscurus        |           | 1         |           |
| Somatochlora               |           |           | -99       |
| <b>RHYNCHOBDELLIDA</b>     |           |           |           |
| Glossiphoniidae            |           |           | 1         |
| <b>TRICHOPTERA</b>         |           |           |           |
| Cheumatopsyche             | 130       | 3         | 5         |
| Hydropsyche                | 13        |           | 1         |
| Oecetis                    |           |           | 2         |
| Triaenodes                 |           |           | 1         |
| <b>TRICLADIDA</b>          |           |           |           |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14915], Station #5, Sample Date: 9/24/2014 2:45:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b> | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|--------------------|-----------|-----------|-----------|
| Planariidae        |           |           | 33        |
| <b>TUBIFICIDA</b>  |           |           |           |
| Enchytraeidae      | 1         | 1         |           |
| Tubificidae        |           | 30        | 2         |
| <b>VENEROIDA</b>   |           |           |           |
| Corbicula          |           | 2         |           |

# **Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [14914], Station #6, Sample Date: 9/24/2014 1:00:00 PM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>      | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|-------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>    |           |           |           |
| Acarina                 | 1         | 4         |           |
| <b>AMPHIPODA</b>        |           |           |           |
| Hyaella azteca          | 1         |           | 4         |
| <b>BASOMMATOPHORA</b>   |           |           |           |
| Ancylidae               | 1         | 1         | 1         |
| Lymnaeidae              |           | 1         | 2         |
| Menetus                 |           |           | 97        |
| Physella                |           | 1         | 28        |
| <b>BRANCHIOBDELLIDA</b> |           |           |           |
| Branchiobdellida        |           |           | 2         |
| <b>COLEOPTERA</b>       |           |           |           |
| Dubiraphia              | 1         |           | 30        |
| Helichus basalis        |           |           | 1         |
| Stenelmis               | 167       | 15        | 6         |
| <b>DECAPODA</b>         |           |           |           |
| Orconectes virilis      | 1         | -99       | 1         |
| <b>DIPTERA</b>          |           |           |           |
| Ablabesmyia             | 1         | 40        | 6         |
| Ceratopogoninae         | 2         | 6         | 3         |
| Chironomidae            | 3         | 5         | 1         |
| Chironomus              |           | 1         |           |
| Chrysops                | 2         |           |           |
| Cladotanytarsus         | 8         | 32        |           |
| Corynoneura             | 8         | 4         | 2         |
| Cricotopus bicinctus    | 1         |           |           |
| Cricotopus/Orthocladius | 1         |           |           |
| Cryptochironomus        | 1         | 6         |           |
| Dicrotendipes           |           |           | 1         |
| Diptera                 |           | 1         |           |
| Dixella                 |           | 2         |           |
| Glyptotendipes          |           |           | 1         |
| Labrundinia             |           |           | 6         |
| Larsia                  | 1         |           |           |
| Microtendipes           |           | 8         | 2         |
| Nanocladius             | 3         |           | 2         |
| Nilotanypus             | 2         |           |           |
| Ormosia                 |           | 2         |           |
| Parachironomus          |           |           | 1         |
| Paracladopelma          |           | 9         |           |



**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14914], Station #6, Sample Date: 9/24/2014 1:00:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| ORDER: TAXA                | CS  | NF  | RM  |
|----------------------------|-----|-----|-----|
| Paramerina                 |     |     | 1   |
| Parametriocnemus           | 2   |     |     |
| Paratanytarsus             | 5   |     | 13  |
| Paratendipes               |     | 1   |     |
| Pentaneura                 | 2   |     |     |
| Phaenopsectra              |     | 1   |     |
| Polypedilum flavum         | 32  |     | 1   |
| Polypedilum halterale grp  |     | 33  |     |
| Polypedilum illinoense grp | 34  | 2   | 3   |
| Polypedilum scalaenum grp  | 5   | 14  | 1   |
| Polypedilum tritum         |     |     | 1   |
| Procladius                 |     | 1   |     |
| Rheotanytarsus             | 6   |     |     |
| Simulium                   | 6   |     |     |
| Stempellinella             | 2   | 3   | 3   |
| Stenochironomus            | 1   |     | 1   |
| Stictochironomus           |     | 18  | 1   |
| Tanytarsus                 | 199 | 26  | 32  |
| Thienemanniella            | 4   |     |     |
| Thienemannimyia grp.       | 15  |     | 4   |
| Zavrelimyia                | 1   | 1   |     |
| EPHEMEROPTERA              |     |     |     |
| Acentrella                 | 3   |     |     |
| Baetis                     | 26  |     |     |
| Caenis latipennis          | 62  | 56  | 39  |
| Stenonema femoratum        | 2   | 5   |     |
| ODONATA                    |     |     |     |
| Aeshnidae                  |     |     | 1   |
| Argia                      |     | 1   | 12  |
| Basiaeschna janata         |     |     | -99 |
| Calopteryx                 |     |     | 9   |
| Enallagma                  |     |     | 9   |
| Hetaerina                  | 3   |     |     |
| Ischnura                   |     |     | 1   |
| Nasiaeschna pentacantha    |     |     | 1   |
| Progomphus obscurus        |     | -99 |     |
| Somatochlora               | -99 |     | 2   |
| TRICHOPTERA                |     |     |     |
| Cheumatopsyche             | 43  |     |     |
| Limnephilidae              |     |     | 1   |
| Oecetis                    |     |     | 2   |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [14914], Station #6, Sample Date: 9/24/2014 1:00:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>       | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|--------------------------|-----------|-----------|-----------|
| TRICLADIDA               |           |           |           |
| Planariidae              |           |           | 1         |
| TUBIFICIDA               |           |           |           |
| Enchytraeidae            | 4         |           |           |
| Limnodrilus hoffmeisteri | 1         |           |           |
| Tubificidae              | 24        | 27        |           |
| VENEROIDA                |           |           |           |
| Pisidiidae               |           | 5         | 4         |

# **Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [15016], Station #1, Sample Date: 3/31/2015 8:30:00 AM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>        | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|---------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>      |           |           |           |
| Acarina                   | 1         | 2         | 6         |
| <b>AMPHIPODA</b>          |           |           |           |
| Hyaella azteca            |           | 1         | 18        |
| <b>ARHYNCHOBDELLIDA</b>   |           |           |           |
| Erpobdellidae             | -99       |           | 1         |
| <b>BASOMMATOPHORA</b>     |           |           |           |
| Menetus                   |           |           | 1         |
| <b>BRANCHIOBDELLIDA</b>   |           |           |           |
| Branchiobdellida          |           |           | 2         |
| <b>COLEOPTERA</b>         |           |           |           |
| Berosus                   |           |           | 1         |
| Dubiraphia                |           |           | 1         |
| Peltodytes                |           | 2         |           |
| Stenelmis                 | 21        | 14        | 4         |
| <b>DECAPODA</b>           |           |           |           |
| Orconectes virilis        |           |           | -99       |
| Palaemonetes kadiakensis  |           |           | -99       |
| <b>DIPTERA</b>            |           |           |           |
| Ablabesmyia               | 1         | 20        | 15        |
| Ceratopogoninae           | 1         | 3         |           |
| Chironomidae              |           | 2         |           |
| Cladotanytarsus           | 18        | 49        | 2         |
| Corynoneura               | 5         | 4         | 6         |
| Cricotopus sylvestris grp | 7         | 3         | 10        |
| Cricotopus trifascia      | 1         |           |           |
| Cricotopus/Orthocladius   | 131       | 28        | 78        |
| Cryptochironomus          | 3         | 15        |           |
| Cryptotendipes            |           | 3         |           |
| Diamesa                   | 1         |           |           |
| Dicrotendipes             |           | 3         | 4         |
| Eukiefferiella            | 23        |           | 1         |
| Eukiefferiella brehmi grp | 1         |           |           |
| Hemerodromia              | 2         |           |           |
| Hydrobaenus               | 18        | 23        | 3         |
| Labrundinia               |           | 1         | 11        |
| Microtendipes             | 3         |           |           |
| Nanocladius               |           | 1         | 14        |
| Nilotanypus               | 2         |           | 2         |
| Nilothauma                |           |           | 1         |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15016], Station #1, Sample Date: 3/31/2015 8:30:00 AM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| ORDER: TAXA                      | CS  | NF | RM  |
|----------------------------------|-----|----|-----|
| Paracladopelma                   | 2   | 1  |     |
| Paralauterborniella              |     | 3  |     |
| Parametriocnemus                 | 2   | 1  | 1   |
| Paratanytarsus                   | 1   | 1  | 17  |
| Paratendipes                     | 3   | 22 |     |
| Phaenopsectra                    |     | 1  |     |
| Polypedilum aviceps              | 2   |    | 1   |
| Polypedilum fallax grp           |     |    | 1   |
| Polypedilum flavum               | 217 | 4  | 6   |
| Polypedilum halterale grp        | 1   | 8  |     |
| Polypedilum illinoense grp       | 1   |    | 4   |
| Polypedilum scalaenum grp        | 13  | 25 | 1   |
| Procladius                       |     | 1  |     |
| Prosimulium                      | 4   |    |     |
| Rheocricotopus                   | 1   |    |     |
| Rheotanytarsus                   | 5   | 2  | 21  |
| Stempellinella                   | 1   |    | 2   |
| Stictochironomus                 | 2   | 13 |     |
| Tabanus                          | -99 |    |     |
| Tanytarsus                       | 13  | 14 | 70  |
| Thienemanniella                  | 2   | 3  | 5   |
| Thienemannimyia grp.             | 14  | 4  | 19  |
| <b>EPHEMEROPTERA</b>             |     |    |     |
| Acerpenna                        | 22  | 1  | 29  |
| Caenis latipennis                | 4   | 5  | 22  |
| Stenonema femoratum              | 2   | 8  | -99 |
| Tricorythodes                    | 1   |    | 2   |
| <b>GORDIOIDEA</b>                |     |    |     |
| Gordiidae                        | 8   | 2  |     |
| <b>ISOPODA</b>                   |     |    |     |
| Caecidotea (Blind & Unpigmented) | 2   | 6  |     |
| <b>LUMBRICINA</b>                |     |    |     |
| Lumbricina                       | 2   | 3  |     |
| <b>ODONATA</b>                   |     |    |     |
| Argia                            |     |    | 12  |
| Calopteryx                       |     |    | 2   |
| Enallagma                        |     |    | 10  |
| Ischnura                         |     |    | -99 |
| Progomphus obscurus              |     | 1  |     |
| <b>TRICHOPTERA</b>               |     |    |     |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15016], Station #1, Sample Date: 3/31/2015 8:30:00 AM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>       | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|--------------------------|-----------|-----------|-----------|
| Cheumatopsyche           | 7         |           | 2         |
| Chimarra                 | 1         |           |           |
| Oecetis                  |           |           | 1         |
| Pycnopsyche              |           |           | -99       |
| <b>TUBIFICIDA</b>        |           |           |           |
| Enchytraeidae            | 3         | 6         | 1         |
| Limnodrilus hoffmeisteri |           | 5         |           |
| Tubificidae              | 15        | 29        | 1         |
| <b>VENEROIDA</b>         |           |           |           |
| Corbicula                | 1         |           |           |

# **Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [15017], Station #2, Sample Date: 3/31/2015 9:55:00 AM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>            | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|-------------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>          |           |           |           |
| Acarina                       | 5         | 3         | 2         |
| <b>AMPHIPODA</b>              |           |           |           |
| Crangonyx                     |           | 1         | 1         |
| Gammarus                      |           | 1         | -99       |
| <b>ARHYNCHOBDELLIDA</b>       |           |           |           |
| Erpobdellidae                 |           |           | -99       |
| <b>BASOMMATOPHORA</b>         |           |           |           |
| Ancylidae                     |           | 1         |           |
| Lymnaeidae                    |           |           | -99       |
| <b>COLEOPTERA</b>             |           |           |           |
| Berosus                       | 2         | 2         | 2         |
| Dubiraphia                    |           |           | 1         |
| Macronychus glabratus         |           |           | 1         |
| Stenelmis                     | 40        | 7         | 3         |
| <b>DECAPODA</b>               |           |           |           |
| Orconectes virilis            |           |           | -99       |
| <b>DIPTERA</b>                |           |           |           |
| Ablabesmyia                   |           | 21        |           |
| Ceratopogoninae               | 7         | 1         | 1         |
| Chaoborus                     |           | 1         |           |
| Chironomidae                  | 2         | 3         | 4         |
| Cladotanytarsus               | 15        | 14        | 2         |
| Clinocera                     |           | 1         |           |
| Corynoneura                   | 14        | 9         | 6         |
| Cricotopus sylvestris grp     | 5         | 1         | 3         |
| Cricotopus trifascia          |           |           | 1         |
| Cricotopus/Orthocladius       | 112       | 33        | 60        |
| Cryptochironomus              | 7         | 12        |           |
| Diamesa                       | 3         | 1         | 1         |
| Dicrotendipes                 | 1         | 11        | 3         |
| Diptera                       | 1         | 1         |           |
| Eukiefferiella                | 5         | 1         | 6         |
| Hemerodromia                  | 1         |           |           |
| Hydrobaenus                   | 66        | 139       | 3         |
| Labrundinia                   |           |           | 6         |
| Nanocladius                   |           |           | 13        |
| Nilotanypus                   | 1         |           |           |
| Orthocladius (Euorthocladius) | 4         |           |           |
| Paracladopelma                | 4         |           |           |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15017], Station #2, Sample Date: 3/31/2015 9:55:00 AM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| ORDER: TAXA                | CS  | NF | RM  |
|----------------------------|-----|----|-----|
| Parakiefferiella           |     | 1  |     |
| Parametriocnemus           | 5   |    |     |
| Paratanytarsus             |     | 3  | 6   |
| Paratendipes               | 2   | 34 |     |
| Polypedilum aviceps        | 1   |    |     |
| Polypedilum flavum         | 127 | 7  | 36  |
| Polypedilum halterale grp  | 1   | 3  |     |
| Polypedilum illinoense grp | 3   | 2  | 2   |
| Polypedilum scalaenum grp  | 32  | 51 | 2   |
| Polypedilum tritum         |     | 1  |     |
| Pseudochironomus           |     | 1  | 1   |
| Rheocricotopus             | 2   |    | 2   |
| Rheotanytarsus             | 3   | 1  | 9   |
| Simulium                   | 9   | 1  | 3   |
| Stempellinella             |     | 1  | 1   |
| Stictochironomus           | 2   | 23 |     |
| Tanytarsus                 | 29  | 26 | 54  |
| Thienemanniella            | 7   | 1  | 6   |
| Thienemannimyia grp.       | 15  | 7  | 9   |
| Tvetenia                   | 1   |    |     |
| Zavrelimyia                | 1   |    |     |
| EPHEMEROPTERA              |     |    |     |
| Acerpenna                  | 13  |    | 7   |
| Caenis latipennis          | 24  | 17 | 53  |
| Stenonema femoratum        | 19  | 9  |     |
| ISOPODA                    |     |    |     |
| Caecidotea                 |     | 4  |     |
| LUMBRICINA                 |     |    |     |
| Lumbricina                 | 4   |    |     |
| ODONATA                    |     |    |     |
| Argia                      | 1   | 1  | 2   |
| Basiaeschna janata         |     |    | -99 |
| Calopteryx                 |     |    | 1   |
| Enallagma                  |     |    | 4   |
| Hagenius brevistylus       |     |    | -99 |
| PLECOPTERA                 |     |    |     |
| Chloroperlidae             | 1   |    |     |
| Perlesta                   | 1   |    |     |
| TRICHOPTERA                |     |    |     |
| Cheumatopsyche             | 6   |    | 2   |
| Helicopsyche               |     |    | 1   |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15017], Station #2, Sample Date: 3/31/2015 9:55:00 AM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>       | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|--------------------------|-----------|-----------|-----------|
| Hydroptila               |           |           | 2         |
| Oecetis                  | 1         |           | 2         |
| Pycnopsyche              |           |           | -99       |
| Triaenodes               |           |           | 3         |
| <b>TUBIFICIDA</b>        |           |           |           |
| Enchytraeidae            | 5         | 3         | 2         |
| Limnodrilus hoffmeisteri | 3         | 1         |           |
| Tubificidae              | 13        | 15        | 4         |
| <b>VENEROIDA</b>         |           |           |           |
| Corbicula                |           |           | 3         |



# **Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [15014], Station #3a, Sample Date: 3/30/2015 3:45:00 PM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>            | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|-------------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>          |           |           |           |
| Acarina                       | 1         | 6         | 1         |
| <b>AMPHIPODA</b>              |           |           |           |
| Crangonyx                     |           |           | 1         |
| <b>ARHYNCHOBDELLIDA</b>       |           |           |           |
| Erpobdellidae                 |           |           | -99       |
| <b>BASOMMATOPHORA</b>         |           |           |           |
| Physella                      | -99       |           |           |
| <b>COLEOPTERA</b>             |           |           |           |
| Berosus                       | 2         | 1         | 1         |
| Hydrochara                    |           |           | -99       |
| Peltodytes                    |           |           | 1         |
| Stenelmis                     | 24        | 3         | 1         |
| Uvarus                        |           |           | 1         |
| <b>DIPTERA</b>                |           |           |           |
| Ablabesmyia                   | 1         | 9         | 10        |
| Ceratopogoninae               | 2         | 3         |           |
| Chironomidae                  | 1         |           | 2         |
| Cladotanytarsus               | 14        | 11        | 2         |
| Corynoneura                   | 9         | 6         | 17        |
| Cricotopus sylvestris grp     | 9         | 1         | 4         |
| Cricotopus/Orthocladius       | 182       | 6         | 69        |
| Cryptochironomus              | 6         | 10        |           |
| Demicryptochironomus          |           | 1         |           |
| Diamesa                       | 2         |           |           |
| Dicrotendipes                 | 1         | 5         | 7         |
| Eukiefferiella                | 3         |           |           |
| Hemerodromia                  | 1         |           | 1         |
| Hydrobaenus                   | 17        | 36        | 6         |
| Labrundinia                   |           |           | 2         |
| Micropsectra                  | 1         | 1         | 5         |
| Microtendipes                 | 1         | 2         |           |
| Nanocladius                   |           | 1         | 5         |
| Nilotanypus                   | 1         |           |           |
| Orthocladius (Euorthocladius) | 5         |           | 1         |
| Paracladopelma                | 1         | 1         |           |
| Parametriocnemus              | 4         |           |           |
| Paratanytarsus                | 1         | 1         | 16        |
| Paratendipes                  | 2         | 30        |           |
| Phaenopsectra                 |           |           | 2         |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15014], Station #3a, Sample Date: 3/30/2015 3:45:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| ORDER: TAXA                | CS  | NF | RM  |
|----------------------------|-----|----|-----|
| Polypedilum aviceps        | 2   |    |     |
| Polypedilum flavum         | 194 | 2  | 2   |
| Polypedilum halterale grp  | 1   | 9  |     |
| Polypedilum illinoense grp | 1   |    | 2   |
| Polypedilum scalaenum grp  | 37  | 62 |     |
| Polypedilum tritum         | 2   |    | 3   |
| Prosimulium                | 2   |    |     |
| Rheotanytarsus             | 9   | 1  | 12  |
| Simulium                   | 9   |    |     |
| Stempellinella             | 1   | 3  | 4   |
| Stictochironomus           | 1   | 12 |     |
| Tabanus                    | -99 |    | 1   |
| Tanytarsus                 | 48  | 17 | 34  |
| Thienemanniella            | 1   |    | 5   |
| Thienemannimyia grp.       | 27  | 5  | 12  |
| Tipula                     | -99 |    |     |
| Tvetenia                   | 1   |    |     |
| Zavrelimyia                | 2   |    | 2   |
| EPHEMEROPTERA              |     |    |     |
| Acerpenna                  | 5   |    | 1   |
| Caenis latipennis          | 8   | 32 | 27  |
| Stenonema femoratum        | 7   | 16 | 6   |
| HEMIPTERA                  |     |    |     |
| Belostoma                  |     |    | -99 |
| Ranatra fusca              |     |    | -99 |
| ISOPODA                    |     |    |     |
| Lirceus                    |     | 1  |     |
| LUMBRICINA                 |     |    |     |
| Lumbricina                 | -99 | 1  |     |
| ODONATA                    |     |    |     |
| Argia                      | -99 | 1  | 5   |
| Calopteryx                 |     |    | 1   |
| Enallagma                  |     |    | 45  |
| Libellula                  |     |    | -99 |
| Macromia                   |     |    | -99 |
| Somatochlora               |     | 1  |     |
| PLECOPTERA                 |     |    |     |
| Amphinemura                | 1   |    |     |
| Chloroperlidae             | 2   |    |     |
| Perlesta                   | 4   |    |     |
| TRICHOPTERA                |     |    |     |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15014], Station #3a, Sample Date: 3/30/2015 3:45:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>       | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|--------------------------|-----------|-----------|-----------|
| Cheumatopsyche           | 10        |           |           |
| Chimarra                 | 8         |           |           |
| Hydropsyche              | -99       |           |           |
| Hydroptila               | 1         |           |           |
| <b>TRICLADIDA</b>        |           |           |           |
| Planariidae              | 1         |           |           |
| <b>TUBIFICIDA</b>        |           |           |           |
| Branchiura sowerbyi      | -99       |           |           |
| Enchytraeidae            | 5         |           |           |
| Limnodrilus hoffmeisteri | 1         |           |           |
| Tubificidae              | 7         | 1         |           |
| <b>VENEROIDA</b>         |           |           |           |
| Corbicula                | -99       |           |           |
| Pisidiidae               | 1         |           |           |

# **Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [15015], Station #3b, Sample Date: 3/30/2015 3:45:00 PM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>            | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|-------------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>          |           |           |           |
| Acarina                       |           | 4         | 3         |
| <b>AMPHIPODA</b>              |           |           |           |
| Crangonyx                     |           |           | 2         |
| <b>BASOMMATOPHORA</b>         |           |           |           |
| Ancylidae                     | 1         |           |           |
| Menetus                       |           |           | 2         |
| Physella                      |           |           | 1         |
| <b>BRANCHIOBDELLIDA</b>       |           |           |           |
| Branchiobdellida              |           |           | 1         |
| <b>COLEOPTERA</b>             |           |           |           |
| Berosus                       | 3         | 1         | 8         |
| Stenelmis                     | 41        | 3         | 2         |
| <b>DIPTERA</b>                |           |           |           |
| Ablabesmyia                   | 2         | 9         | 13        |
| Ceratopogoninae               | 1         | 3         |           |
| Chironomidae                  |           |           | 1         |
| Cladotanytarsus               | 2         | 16        | 4         |
| Clinocera                     | 2         | 1         |           |
| Corynoneura                   | 2         | 4         | 18        |
| Cricotopus sylvestris grp     | 7         | 4         | 6         |
| Cricotopus/Orthocladius       | 191       | 14        | 81        |
| Cryptochironomus              | 1         | 17        | 1         |
| Diamesa                       | 1         |           |           |
| Dicrotendipes                 | 3         | 8         | 8         |
| Eukiefferiella                | 8         |           |           |
| Hemerodromia                  | 1         |           |           |
| Hydrobaenus                   | 15        | 47        | 5         |
| Labrundinia                   |           |           | 4         |
| Microtendipes                 | 2         | 2         |           |
| Nanocladius                   | 1         |           | 8         |
| Natarsia                      |           | 1         | 1         |
| Orthocladius (Euorthocladius) | 14        |           | 1         |
| Paracladopelma                |           | 1         |           |
| Parametriocnemus              | 3         |           |           |
| Paratanytarsus                | 3         | 2         | 12        |
| Paratendipes                  | 1         | 27        | 1         |
| Phaenopsectra                 | 1         | 2         | 2         |
| Polypedilum aviceps           | 3         |           | 1         |
| Polypedilum flavum            | 176       | 7         | 1         |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15015], Station #3b, Sample Date: 3/30/2015 3:45:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| ORDER: TAXA                | CS | NF  | RM  |
|----------------------------|----|-----|-----|
| Polypedilum halterale grp  |    | 12  |     |
| Polypedilum illinoense grp |    |     | 10  |
| Polypedilum scalaenum grp  | 3  | 62  | 2   |
| Polypedilum tritum         | 3  |     | 1   |
| Prosimulium                | 4  |     |     |
| Rheocricotopus             |    | 1   | 1   |
| Rheotanytarsus             | 12 | 2   | 10  |
| Simulium                   | 9  |     |     |
| Stempellinella             | 2  | 4   | 1   |
| Stictochironomus           |    | 8   |     |
| Tabanus                    | 1  | -99 |     |
| Tanytarsus                 | 34 | 18  | 71  |
| Thienemanniella            | 1  | 2   | 3   |
| Thienemannimyia grp.       | 25 | 8   | 15  |
| Tvetenia                   | 1  |     |     |
| Tvetenia bavarica grp      | 1  |     |     |
| Zavrelimyia                | 1  |     |     |
| <b>EPHEMEROPTERA</b>       |    |     |     |
| Acerpenna                  | 2  |     | 1   |
| Caenis latipennis          | 12 | 15  | 43  |
| Stenonema femoratum        | 12 | 9   | 9   |
| <b>ISOPODA</b>             |    |     |     |
| Caecidotea                 | 3  |     |     |
| <b>LEPIDOPTERA</b>         |    |     |     |
| Crambidae                  | 1  |     |     |
| <b>LUMBRICINA</b>          |    |     |     |
| Lumbricina                 | 1  | 1   |     |
| <b>ODONATA</b>             |    |     |     |
| Argia                      | 1  | 3   | 6   |
| Calopteryx                 |    |     | 1   |
| Enallagma                  |    |     | 46  |
| Macromia                   |    |     | -99 |
| <b>PLECOPTERA</b>          |    |     |     |
| Chloroperlidae             |    | 1   |     |
| Perlesta                   | 6  |     |     |
| <b>TRICHOPTERA</b>         |    |     |     |
| Cheumatopsyche             | 10 |     | 1   |
| Chimarra                   | 21 |     |     |
| Hydroptila                 | 1  |     |     |
| Oecetis                    | 1  |     |     |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15015], Station #3b, Sample Date: 3/30/2015 3:45:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>       | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|--------------------------|-----------|-----------|-----------|
| Pycnopsyche              |           |           | -99       |
| TRICLADIDA               |           |           |           |
| Planariidae              | 1         |           |           |
| TUBIFICIDA               |           |           |           |
| Enchytraeidae            | 1         |           | 2         |
| Limnodrilus hoffmeisteri | 1         |           |           |
| Tubificidae              | 6         | 2         | 3         |
| VENEROIDA                |           |           |           |
| Corbicula                | 1         |           |           |

# **Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [15018], Station #4, Sample Date: 3/31/2015 11:30:00 AM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>            | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|-------------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>          |           |           |           |
| Acarina                       |           | 1         |           |
| <b>AMPHIPODA</b>              |           |           |           |
| Crangonyx                     |           | 1         | 1         |
| Hyalella azteca               |           |           | 1         |
| Stygobromus                   |           |           | 1         |
| <b>ARHYNCHOBDELLIDA</b>       |           |           |           |
| Erpobdellidae                 |           |           | -99       |
| <b>COLEOPTERA</b>             |           |           |           |
| Berosus                       | 2         |           | 5         |
| Coptotomus                    |           |           | -99       |
| Peltodytes                    |           |           | 1         |
| Stenelmis                     | 14        | 8         | 4         |
| <b>DIPTERA</b>                |           |           |           |
| Ablabesmyia                   |           | 15        | 8         |
| Ceratopogoninae               | 1         | 4         |           |
| Chironomidae                  |           | 6         | 5         |
| Chrysops                      |           | 1         |           |
| Cladotanytarsus               | 4         |           | 1         |
| Corynoneura                   | 1         | 2         | 10        |
| Cricotopus bicinctus          |           |           | 1         |
| Cricotopus sylvestris grp     | 12        | 1         | 4         |
| Cricotopus/Orthocladius       | 86        | 10        | 53        |
| Cryptochironomus              | 7         | 6         | 1         |
| Diamesa                       | 1         |           |           |
| Dicrotendipes                 | 1         | 5         | 8         |
| Forcipomyiinae                |           | 1         |           |
| Hemerodromia                  | 1         |           |           |
| Hydrobaenus                   | 144       | 67        | 55        |
| Microtendipes                 |           | 1         |           |
| Nanocladius                   | 1         |           | 4         |
| Nilotanypus                   | 1         |           | 1         |
| Ormosia                       | 4         |           |           |
| Orthocladius (Euorthocladius) | 2         |           |           |
| Paracladopelma                | 3         | 1         |           |
| Paralauterborniella           | 1         |           |           |
| Parametriocnemus              | 7         |           | 2         |
| Paratanytarsus                | 2         | 1         | 22        |
| Paratendipes                  | 6         | 28        | 6         |
| Phaenopsectra                 | 1         |           | 2         |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15018], Station #4, Sample Date: 3/31/2015 11:30:00 AM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>         | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|----------------------------|-----------|-----------|-----------|
| Polypedilum flavum         | 41        | 1         | 6         |
| Polypedilum halterale grp  |           | 1         |           |
| Polypedilum illinoense grp | 1         |           | 14        |
| Polypedilum scalaenum grp  | 78        | 29        | 3         |
| Polypedilum tritum         | 5         | 1         | 5         |
| Prosimulium                | 1         |           |           |
| Rheocricotopus             |           |           | 1         |
| Rheotanytarsus             | 1         |           | 6         |
| Simulium                   | 2         |           | 1         |
| Stempellinella             | 1         | 2         | 1         |
| Stictochironomus           | 3         | 14        |           |
| Tabanus                    | -99       |           |           |
| Tanytarsus                 | 32        | 5         | 52        |
| Thienemanniella            |           |           | 2         |
| Thienemannimyia grp.       | 9         | 6         | 14        |
| Tipula                     | -99       |           |           |
| Tribelos                   | 1         |           |           |
| Tvetenia                   | 3         |           | 1         |
| Zavrelimyia                |           | 4         | 3         |
| <b>EPHEMEROPTERA</b>       |           |           |           |
| Caenis latipennis          | 10        | 44        | 41        |
| Stenonema femoratum        | 2         | 9         |           |
| <b>HAPLOTAXIDA</b>         |           |           |           |
| Haplotaxis                 |           | 1         |           |
| <b>ODONATA</b>             |           |           |           |
| Argia                      |           | -99       |           |
| Calopteryx                 |           |           | 1         |
| Enallagma                  |           | 1         |           |
| Gomphidae                  |           | -99       |           |
| <b>TRICHOPTERA</b>         |           |           |           |
| Cheumatopsyche             | 3         | 1         | 3         |
| <b>TUBIFICIDA</b>          |           |           |           |
| Enchytraeidae              | 3         | 4         | 3         |
| Limnodrilus hoffmeisteri   | 2         | 2         |           |
| Tubificidae                | 7         | 9         |           |



# **Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [15019], Station #5, Sample Date: 3/31/2015 1:20:00 PM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>        | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|---------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>      |           |           |           |
| Acarina                   |           |           | 4         |
| <b>AMPHIPODA</b>          |           |           |           |
| Crangonyx                 | -99       |           | -99       |
| Hyaella azteca            |           |           | 1         |
| <b>BASOMMATOPHORA</b>     |           |           |           |
| Physella                  |           |           | 2         |
| <b>COLEOPTERA</b>         |           |           |           |
| Berosus                   |           |           | 1         |
| Dubiraphia                |           | 1         |           |
| Ectopria nervosa          | 1         |           |           |
| Peltodytes                |           | 1         |           |
| Stenelmis                 | 159       | 9         | 2         |
| <b>DIPTERA</b>            |           |           |           |
| Ablabesmyia               |           | 7         | 28        |
| Ceratopogoninae           | 3         | 2         | 1         |
| Chaoborus                 |           |           | 1         |
| Chironomidae              | 2         |           | 7         |
| Cladotanytarsus           |           | 2         | 2         |
| Clinocera                 |           | 1         |           |
| Corynoneura               | 1         | 3         | 10        |
| Cricotopus sylvestris grp | 34        | 2         | 9         |
| Cricotopus/Orthocladius   | 169       | 34        | 54        |
| Cryptochironomus          | 4         | 4         |           |
| Cryptotendipes            | 1         |           |           |
| Demicryptochironomus      |           |           | 1         |
| Dicrotendipes             |           | 2         | 3         |
| Hydrobaenus               | 4         | 33        | 4         |
| Larsia                    |           |           | 1         |
| Microtendipes             | 1         | 3         |           |
| Nanocladius               | 3         |           | 9         |
| Nemotelus                 |           | 1         |           |
| Nilotanypus               | 4         |           | 2         |
| Nilothauma                | 1         |           |           |
| Parametriocnemus          |           | 1         |           |
| Paratanytarsus            |           | 2         | 5         |
| Paratendipes              | 3         | 9         | 4         |
| Phaenopsectra             | 1         | 1         |           |
| Polypedilum fallax grp    | 1         |           |           |
| Polypedilum flavum        | 69        | 1         | 23        |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15019], Station #5, Sample Date: 3/31/2015 1:20:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>         | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|----------------------------|-----------|-----------|-----------|
| Polypedilum halterale grp  |           | 24        |           |
| Polypedilum illinoense grp | 19        | 4         | 15        |
| Polypedilum scalaenum grp  | 15        | 22        | 2         |
| Procladius                 |           | 3         |           |
| Prosimulium                | 3         |           |           |
| Pseudochironomus           | 1         |           |           |
| Rheotanytarsus             | 14        | 7         | 15        |
| Stictochironomus           |           | 46        |           |
| Tabanus                    |           | 1         |           |
| Tanytarsus                 | 11        | 11        | 72        |
| Thienemanniella            | 1         |           |           |
| Thienemannimyia grp.       | 18        | 6         | 16        |
| Tipula                     | 1         |           |           |
| <b>EPHEMEROPTERA</b>       |           |           |           |
| Caenis latipennis          |           | 3         | 1         |
| Stenonema femoratum        | 1         | 2         |           |
| <b>GORDIOIDEA</b>          |           |           |           |
| Gordiidae                  |           |           | 1         |
| <b>ODONATA</b>             |           |           |           |
| Argia                      |           |           | 6         |
| Calopteryx                 |           |           | -99       |
| Enallagma                  |           | 3         | 18        |
| Somatochlora               |           |           | 1         |
| <b>TRICHOPTERA</b>         |           |           |           |
| Cheumatopsyche             | 16        | 3         | 3         |
| Hydropsyche                | 27        |           | 3         |
| Hydroptila                 |           | 2         |           |
| <b>TRICLADIDA</b>          |           |           |           |
| Planariidae                | 7         |           | 1         |
| <b>TUBIFICIDA</b>          |           |           |           |
| Enchytraeidae              | 34        | 10        | 3         |
| Limnodrilus claparedianus  | 1         |           |           |
| Limnodrilus hoffmeisteri   | 1         | 16        |           |
| Tubificidae                | 11        | 61        |           |

# **Aquid Invertebrate Database Bench Sheet Report**

**Peruque Cr [15020], Station #6, Sample Date: 3/31/2015 2:25:00 PM**

**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>        | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|---------------------------|-----------|-----------|-----------|
| <b>"HYDRACARINA"</b>      |           |           |           |
| Acarina                   | 2         | 1         | 8         |
| <b>ARHYNCHOBDELLIDA</b>   |           |           |           |
| Erpobdellidae             | 1         |           |           |
| <b>BASOMMATOPHORA</b>     |           |           |           |
| Ancylidae                 |           |           | 1         |
| Menetus                   |           |           | 4         |
| Physella                  | 1         |           | 1         |
| <b>BRANCHIOBDELLIDA</b>   |           |           |           |
| Branchiobdellida          |           | 1         | 2         |
| <b>COLEOPTERA</b>         |           |           |           |
| Dubiraphia                |           | 1         | 2         |
| Stenelmis                 | 82        | 4         |           |
| <b>DECAPODA</b>           |           |           |           |
| Orconectes virilis        | -99       | 1         | 1         |
| <b>DIPTERA</b>            |           |           |           |
| Ablabesmyia               |           | 3         | 9         |
| Ceratopogoninae           | 1         |           |           |
| Chironomidae              | 2         | 1         |           |
| Chrysops                  | 3         |           |           |
| Cladotanytarsus           | 1         | 3         | 1         |
| Clinocera                 | 4         | 1         |           |
| Corynoneura               | 1         | 6         | 18        |
| Cricotopus sylvestris grp | 4         |           | 1         |
| Cricotopus/Orthocladius   | 98        | 16        | 27        |
| Cryptochironomus          | 3         | 8         | 2         |
| Dicrotendipes             |           | 2         | 4         |
| Eukiefferiella            | 2         |           |           |
| Glyptotendipes            |           |           | 1         |
| Hydrobaenus               | 76        | 12        | 23        |
| Microtendipes             |           | 1         | 5         |
| Nanocladius               | 1         |           | 33        |
| Paracladopelma            |           | 1         |           |
| Parakiefferiella          |           |           | 1         |
| Parametriocnemus          | 24        |           |           |
| Paratanytarsus            | 1         | 4         | 29        |
| Paratendipes              |           | 12        | 6         |
| Phaenopsectra             | 2         | 2         | 2         |
| Polypedilum aviceps       | 9         |           |           |
| Polypedilum fallax grp    |           | 1         |           |

**Aquid Invertebrate Database Bench Sheet Report**  
**Peruque Cr [15020], Station #6, Sample Date: 3/31/2015 2:25:00 PM**  
**CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence**

| <b>ORDER: TAXA</b>         | <b>CS</b> | <b>NF</b> | <b>RM</b> |
|----------------------------|-----------|-----------|-----------|
| Polypedilum flavum         | 154       | 3         | 1         |
| Polypedilum halterale grp  | 3         | 18        | 1         |
| Polypedilum illinoense grp | 6         | 5         | 11        |
| Polypedilum scalaenum grp  | 28        | 12        | 1         |
| Prosimulium                | 2         |           |           |
| Rheotanytarsus             | 3         | 1         |           |
| Simulium                   | 3         |           |           |
| Stempellinella             | 2         | 2         | 2         |
| Stictochironomus           | 5         | 51        | 1         |
| Tanytarsus                 | 62        | 20        | 77        |
| Thienemanniella            | 14        |           | 7         |
| Thienemannimyia grp.       | 23        | 1         | 4         |
| Tvetenia                   | 5         |           |           |
| Zavreliomyia               |           | 1         |           |
| <b>EPHEMEROPTERA</b>       |           |           |           |
| Acerpenna                  | 1         |           |           |
| Caenis latipennis          | 5         | 15        | 13        |
| Stenonema femoratum        | 2         |           |           |
| <b>ODONATA</b>             |           |           |           |
| Argia                      |           | 1         | 3         |
| Calopteryx                 |           |           | 1         |
| Dromogomphus               |           |           | -99       |
| Enallagma                  |           |           | 3         |
| Ischnura                   |           |           | 1         |
| Somatochlora               | -99       |           | 3         |
| <b>PLECOPTERA</b>          |           |           |           |
| Perlidae                   | 1         |           |           |
| <b>TRICHOPTERA</b>         |           |           |           |
| Cheumatopsyche             | 15        |           | 2         |
| Chimarra                   | 1         |           |           |
| Ironoquia                  | 1         |           |           |
| Rhyacophila                | -99       |           |           |
| <b>TRICLADIDA</b>          |           |           |           |
| Planariidae                |           |           | 1         |
| <b>TUBIFICIDA</b>          |           |           |           |
| Enchytraeidae              | 3         | 3         |           |
| Limnodrilus claparedianus  |           | 3         |           |
| Limnodrilus hoffmeisteri   | 6         | 1         |           |
| Tubificidae                | 27        | 9         | 3         |
| <b>VENEROIDA</b>           |           |           |           |
| Pisidiidae                 | 3         | 1         | 1         |

## Appendix D

Addendum: Benthic Sediment Deposition Estimation Study

Added to Report November 1, 2016

## **Introduction**

As stated in Section 3.0 of the report, due to consistently elevated stream levels during the study period, benthic sediment (less than 2mm) estimation was conducted after submission of the final report. During the summer of 2016, Brandy Bergthold and Carl Wakefield of ESP conducted this portion of the study.

The upper Peruque Creek is in a progressively urbanizing watershed. This urbanization can make the stream susceptible to land and hydrologic disturbance that results in instream sedimentation, which adversely affects aquatic macroinvertebrate habitat substrate (Li and Wang 2009). This portion of the stressor study was conducted to quantitatively assess the amount of benthic fine sediment in the Peruque Creek study stations in comparison with local control streams within the same Ecological Drainage Unit (EDU).

## **Null Hypothesis**

The percent of benthic fine sediment coverage will not differ between each Peruque station and the control streams.

## **Study Area**

The six Peruque Creek stations were compared with eight control stations located throughout the Central Plains/Cuivre/Salt EDU. These control stations were the same as those used for the FY 2009 Dardenne Creek Biological Assessment Study (MDNR 2009). These stations are listed below.

Hays Creek (NW ¼ sec. 29, T. 54 N., R. 5 W.) was located upstream of the Bridgewater Lane bridge with geographic coordinates of UTM Grid 15, E 629917, N 4366398 in Ralls County.

North Fork Cuivre River (Section Line 13/14, T. 51 N., R. 3 W.) was located downstream of the County Road 325 bridge with geographic coordinates of UTM Grid 15, E 655188, N4339803 in Pike County.

Big Creek (NW ¼ sec. 34, T. 48 N., R. 2 W.) was located upstream of the North Church Rock Road with geographic coordinates of UTM Grid 15, E 662317, N 4305582 in Warren County.

Sugar Creek (NW ¼ sec. 31, T. 50 N., R. 1 E.) was located upstream of State Road KK with geographic coordinates of UTM Grid 15, E 677738, N 4325175 in Cuivre River State Park in Lincoln County.

South River #1 (SW ¼ sec. 29, T. 58 N., R. 5 W.) was located downstream of CR 402 with geographic coordinates estimated using ArcMap® of UTM Grid 15, E 629504, N 4405831 in Marion County.

South River #2 (SE  $\frac{1}{4}$  sec. 30, T. 58 N., R. 5 W.) was located approximately 0.5 miles west of CR 402 crossing with estimated geographic coordinates of UTM Grid 15, E 628865, N 4405694 in Marion County.

South River #3 (NW  $\frac{1}{4}$  NE  $\frac{1}{4}$  sec. 31, T. 58 N., R. 5 W.) was located downstream of the CR 403 crossing with geographic coordinates of UTM Grid 15, E 628341, N 4404786 at the upstream terminus in Marion County.

South River #4 (NE  $\frac{1}{4}$  sec. 31, T. 58 N., R. 5 W.) was located upstream of the CR 403 crossing with geographic coordinates of UTM Grid 15, E 628341, N 4404786 at the downstream terminus in Marion County.

### **Methods**

Within each stream segment, the percentage of fine sediment coverage was visually estimated according to methods outlined in MDNR-ESP-115 *Estimation of Benthic Fine Sediment Coverage in Wadeable Streams* (MDNR 2014). A total of 18 measurements were made at each station using the estimation of two investigators. At each station three grids were established at the upper pool/lower riffle interface. Grid areas used for surveys had a flow of less than 0.5 feet per second and were less than 2.5 feet in depth. Within each grid were six transects of one foot in width where a metal quadrat (25cm X 25cm) was placed using a random number generator to correspond with a tape measure mounted from bank to bank. The estimations were made within the quadrat placement.

For each quadrat measurement, each surveyor visually estimated the percent coverage of fine sediment. If their estimates did not differ by more than 10 percent, the measurement was accepted, and the average was reported and used for analysis. If the estimates of the surveyors differed by more than 10 percent, they repeated the process until the estimates were within the acceptable margin of error. See MDNR-ESP-115 (MDNR 2014) for further details.

### **Data Analysis**

Sediment data were pooled for the control streams and compared with each of the Peruque Creek stations. A Kruskal-Wallis One Way Analysis of Variance on Ranks was conducted using SigmaStat<sup>®</sup>. See MDNR-ESP-115 (MDNR 2014) for further details.

### **Results**

A summary of data for each stream section is presented in Table 1.

Peruque Stations #2 and #3 were the only stations to show a significant difference in percent fine sediment deposition in this survey compared to the control sites. These two stations had a significantly higher percentage of benthic fine sediment than the control sites. See the SigmaStat<sup>®</sup> report on the final page of this addendum for details.

Table #1  
Summary of Benthic Sediment Deposition Visual Estimations for Each Station (Percent)

| Stream Site | Mean | Median | Range      | Standard Deviation |
|-------------|------|--------|------------|--------------------|
| PC1         | 28.1 | 17.5   | 4 - 100    | 27.2               |
| PC2*        | 61.2 | 63.8   | 5 - 100    | 34.3               |
| PC3*        | 82.3 | 90.0   | 22.5 - 100 | 22.8               |
| PC4         | 15.4 | 10.0   | 1 – 67.5   | 16.6               |
| PC5         | 25.0 | 18.8   | 2.5 – 92.5 | 23.3               |
| PC6         | 50.5 | 37.5   | 10 - 99    | 35.0               |
| Hays Cr.    | 20.3 | 7.75   | 0 - 95     | 27.9               |
| NF Cuivre   | 36.9 | 30.0   | 2 - 90     | 30.8               |
| Big Cr.     | 32.4 | 10.0   | 0 - 100    | 40.6               |
| Sugar Cr.   | 13.9 | 10.0   | 2 – 57.5   | 13.2               |
| South 1     | 49.2 | 53.8   | 3 - 100    | 31.8               |
| South 2     | 42.6 | 30.0   | 5 - 99     | 36.2               |
| South 3     | 41.1 | 33.8   | 1 - 100    | 32.9               |
| South 4     | 41.0 | 33.75  | 1 - 100    | 37.1               |

\* Statistically significant difference from control streams

## Discussion

There were no apparent relationships between benthic fine sediment deposition and macroinvertebrate communities. Peruque Creek Stations #2 and #3 were the only two stations to differ significantly from the control streams in the amount of measured benthic fine sediment. However each received the same partially supporting ranking as all stations during the spring sampling season. Peruque Creek Stations #2 and #3 were two of three to receive fully supporting scores during the fall sampling season, whereas the other three stations were partially supporting.

No other exceptional or noticeable land use was apparent to explain why these two stations have significantly higher benthic fine sediment cover when the others did not. The only noteworthy condition is the substrate at Station #2 has a considerable amount of bedrock. Nevertheless, much of the substrate at Peruque Station #5 is bedrock as well, and it did not have a significantly higher amount of benthic fine sediment cover.

Compared to the benthic fine sediment estimation conducted in July 2002 as part of the previous Peruque Creek bioassessment study (MDNR 2003), Station #6 was the only site to have significantly higher benthic fine sediment coverage than the control stream. In that study, however, North Fork Cuivre River was the only control stream used for benthic fine sediment cover.

## Summary

The null hypothesis that benthic fine sediment among Peruque Creek sample sites will not differ from control sites is accepted for Peruque Creek Stations #1, #4, #5, and #6 and rejected for Stations #2 and #3.



One Way Analysis of Variance Thursday, September 08, 2016, 2:47:02 PM

Data source: Data 1 in Notebook 1

Dependent Variable: Visual Estimate

Normality Test: Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks Thursday, September 08, 2016, 2:47:02 PM

Data source: Data 1 in Notebook 1

| Group   | N   | Missing | Median | 25%    | 75%    |
|---------|-----|---------|--------|--------|--------|
| PC1     | 18  | 0       | 17.500 | 10.000 | 35.000 |
| PC2     | 18  | 0       | 63.750 | 32.500 | 95.000 |
| PC3     | 18  | 0       | 90.000 | 80.000 | 95.200 |
| PC4     | 18  | 0       | 10.000 | 5.000  | 25.000 |
| PC5     | 18  | 0       | 18.750 | 10.000 | 35.000 |
| PC6     | 18  | 0       | 37.500 | 17.500 | 85.000 |
| Control | 144 | 0       | 17.500 | 5.000  | 60.000 |

$H = 47.131$  with 6 degrees of freedom. ( $P = < 0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = < 0.001$ ).

To isolate the group or groups that differ from the others use a multiple comparison procedure.

Multiple Comparisons versus Control Group (Dunn's Method):

| Comparison     | Diff of Ranks | Q     | $P < 0.05$  |
|----------------|---------------|-------|-------------|
| PC3 vs Control | 92.882        | 5.097 | Yes         |
| PC2 vs Control | 57.049        | 3.131 | Yes         |
| PC6 vs Control | 43.326        | 2.378 | No          |
| PC4 vs Control | 38.924        | 2.136 | Do Not Test |
| PC5 vs Control | 8.451         | 0.464 | Do Not Test |
| PC1 vs Control | 2.479         | 0.136 | Do Not Test |

Note: The multiple comparisons on ranks do not include an adjustment for ties.

### **Literature Cited**

Li, Y. and C. Wang. 2009. Impacts of Urbanization on Surface Runoff of the Dardenne Creek

Watershed, St. Charles County, Missouri. *Physical Geography* 30(6): 556- 573.

Missouri Department of Natural Resources. 2003. Final Biological Assessment Report, Peruque Creek, St. Charles and Warren Counties, MO. Missouri Department of Natural Resources, Environmental Services Program, P. O. Box 176 Jefferson City, MO 65102.

<http://dnr.mo.gov/env/esp/docs/PeruqueCreekFinalReport.pdf>

Missouri Department of Natural Resources. 2009. Final Biological Assessment Report, Dardenne Creek, St. Charles County, MO. Missouri Department of Natural Resources, Environmental Services Program, P. O. Box 176 Jefferson City, MO 65102.

<http://dnr.mo.gov/env/esp/docs/DardenneCreekFY2009BioReport.pdf>

Missouri Department of Natural Resources. 2014. Estimation of Benthic Fine Sediment Coverage in Wadeable Streams. MDNR –ESP-115. Missouri Department of Natural Resources, Environmental Services Program, P. O. Box 176, Jefferson City, Jefferson City, Missouri 65102. 14pp.